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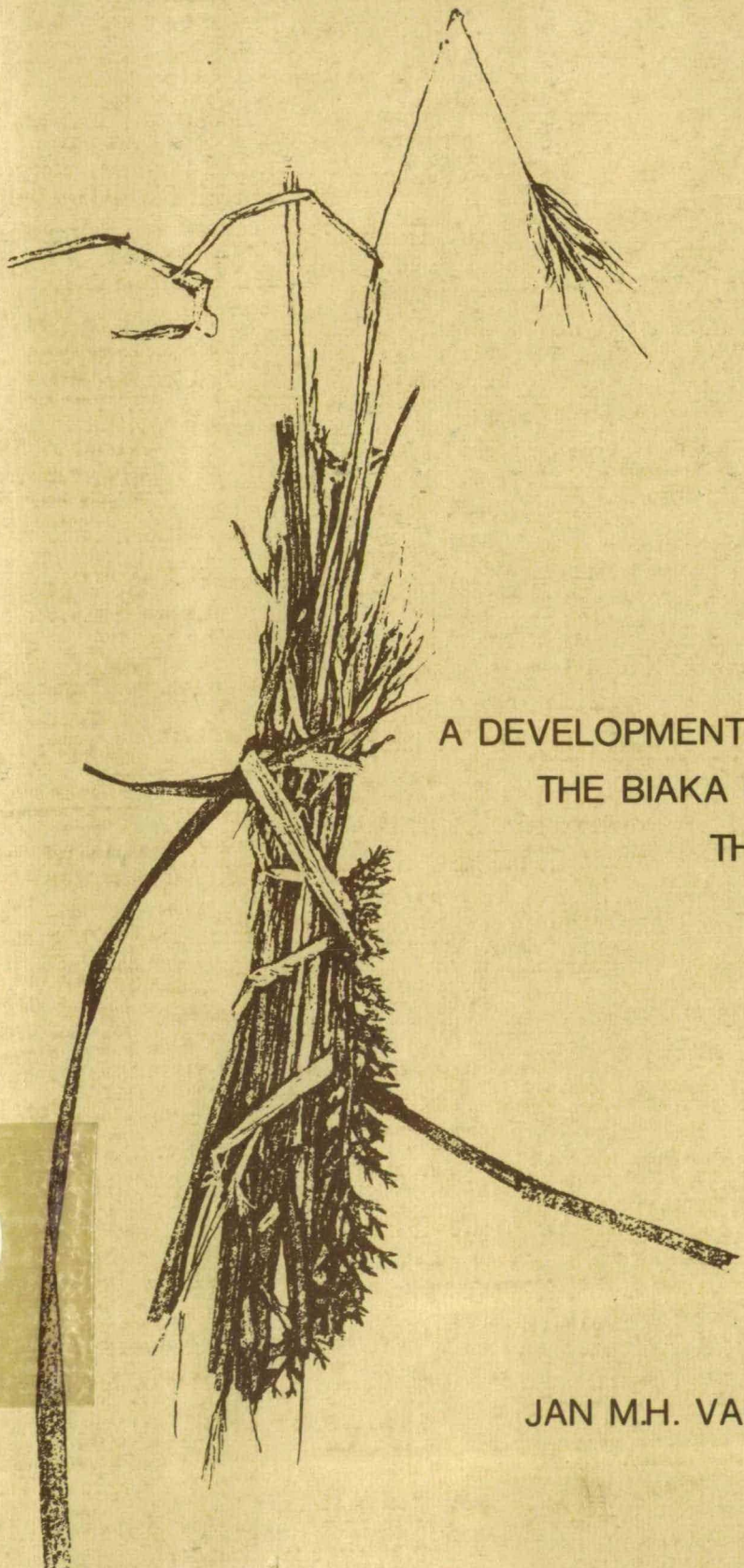

A DEVELOPMENTAL STUDY OF THE BIAKA PYGMIES AND THE BANGANDU

JAN M.H. VAN DE KOPPEL

A DEVELOPMENTAL STUDY OF THE BIAKA PYGMIES AND BANGANDU

KATHOLIEKE HOGESCHOOL TILBURG

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To my parents

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CONTENTS

CHAPTER 1: PSYCHOLOGICAL DIFFERENTIATION AND HUMAN ECOLOGY

1.1 Psychological Differentiation

Perception is an interactive process involving both a field and a receiver. At one end there is the stimulus, often not as one concrete and clear signal, but hidden in a context. Hidden refers to the situation of being organised in a larger whole of which it is a part. A high degree of organisation or "embedding", as it was called by Witkin and his co-workers (Witkin, Lewin, Hertzman, Machover, Meissner & Wapner (1954)), makes it more difficult for the perceiving organism to spot the signal. On the other hand, a relatively high degree of organisation at the other pole, i.e. the perceiving person, is a good prerequisite for finding the hidden signal. Especially when perception takes place in an ambiguously organised field, there will be a high degree of influence from the part of the receiver.

The first studies regarding the influence and especially the relative strength of both factors, the perceiver and the field, were done at the end of the forties. Asch and Witkin (1948) used an experimental setting in which a person sitting in a dark room had to bring an illuminated rod, which was placed in a tilted illuminated square frame, into a vertical position. The chair in which the subject was sitting, could be tilted. This test, the Rod and Frame Test, allows the subject to make use of two points of reference, the illuminated rod and the position of his own body. In the normal sitting position, which is vertical, this is a relatively easy task. Being in a tilted position, the subject looses this point of reference. On each trial the deviation of the rod from the vertical is determined. A high deviation points to dependence on the tilted visual field, a low one points to a reference to the person's experience of the vertical. In further studies by Witkin, Dyk, Faterson, Goodenough and Karp (1962, 1974) the test was made more complicated.

Besides the Rod and Frame Test (R.F.T.), the Tilting Room Tilting Chair Test was designed. The apparatus used is a large box called "room" with a chair inside. Both can be tilted independently. In what was called the Body Adjustment Test (B.A.T.), one of the possible uses of the apparatus, the person is asked to bring his body in a vertical position. The room being tilted distorts the perception and gives no direct reference to the vertical as the walls of a room normally do. A deviation from the vertical registered after the person has indicated that he is sitting in a vertical position, implies that he could not fully resist the influence of the visual field.

An important observation was that subjects showed a large degree of self-consistency over time but also over

the several test situations. The degree of reliance either on the body or on the field appeared to be a persistent characteristic of people. In other words they showed a stable way of processing the information from body and visual field. In this period of the research in this area the word "style" came in use. The perceptual style of a person was thought to be a manifestation of the degree of dependence on the structure of a predominating visual field. At one extreme of what was often called a dimension, one would see a total absence of the ability to analyse the field and to perceive the vertical as distinct from the visual context. At the other extreme one would be confronted with people who only relied on their own internal references. These, of course, are extreme positions, not found in reality. People appeared to be somewhere in the continuum between the extremes. (Some misunderstanding was, however, caused by the two terms which came in use to indicate these extremes.) The ability to overcome the influence of an "embedding context" was called field independence; the opposite was termed with field dependence.

Another test which was proved to be closely related to the ones mentioned was the Embedded Figures Test (Witkin et al., 1954; Witkin et al., 1962, 1974; Witkin, Oltman, Raskin & Karp, 1971). The scores obtained with this test being highly correlated, it appeared to be manifestations of a same underlying phenomenon. In this test an item has to be taken out of the field of which it is a part. Verticality or body position, however, does not play a role. The task is to find a simple figure in a complex one in which it is "hidden". This does not mean that it is made invisible by distracting lines or other elements which confuse the perceiver. It is hidden because it has been embedded in a figure; it is part of a larger meaningful whole in which it has its own function as a constituent element. The simple figure looses its own "Gestalt"property, being dissolved in a larger whole. The subject is confronted with the task to find the simple figures in a series of complex figures. The mean time needed to detect all of the figures is an indication of the degree to which someone's perception is influenced by the surroundings in which it takes place.

Although the relation with what used to be called field independence was clear, it was only later on that both field independence and what had been called restructuring, were seen as elements of one and the same cognitive style (e.g. Witkin & Goodenough, 1977b). For the Embedded Figures Test (E.F.T.) the task seemed to be one of analysis and restructuring. Restructuring was considered to "entail organizing a field which lacks inherent structure, imposing a different organization of the field than the one it contains, or breaking up an organized field so that its parts are rendered discrete from ground" (Witkin,

1977). Other manifestations of the ability of restructuring like speed of closure and the "decentration" from the Piagetian psychology, appeared also to be closely related to field independence.

Field dependence-independence is called a "cognitive style" (Witkin, 1977). A cognitive style can be defined as the way an individual approaches or conceptualizes a problem. It is his way of perceiving and consequent problem solving and is closely linked to his personality. For the sake of brevity we will call the dimension of field dependence-independence the cognitive style of field independence and only use this term, even when referring to contrasting group performances.

Another feature which appeared to be closely related to field independence appeared to be the body concept. The body concept is the persisting impression someone has of his own body both in a cognitive and in an affective way. It is a systematic and imposing image one has, consciously as well as unconsciously. People who are field independent appeared to have an articulated body concept. The body is experienced as being one independent whole with clear boundaries. The bodily parts are seen as being distinct the one from the other, but related to each other in a structured whole. Drawings of the human figure have been used to assess the degree of articulation of the body concept (Witkin et al., 1962, 1974). The ideal self image, the perception of one's own body and the experiences within one's own culture, all play a role. These aspects, however, are organized in the concept of the body as it is experienced by the individual. Human figure drawings of field-dependent people appear to be very global; the drawings show little detail. The pictures are not very realistic and the relations of the bodily parts are not sophisticated. Performances as measured with scales designed for this purpose like the Sophistication of Body Concept Scale (S.B.C.S.) correlated with results on tests like the E.F.T. and R.F.T. (Witkin et al., 1962, 1974).

Essentially there is a cognitive basis for the difference between field-dependent and more field-independent people (Witkin, 1977). Yet it appeared that an important characteristic of field independence is how people see themselves in relation to others. The perception of oneself has been called the "sense of separate identity". It was described by Witkin et al. (1962, 1974) in the following way: "A 'sense of separate identity' is the result of development of awareness of one's own needs and characteristics as distinct from those of others" (p 155). A low degree of development of this sense is manifested by a strong dependence on external references to determine one's own attitudes and feelings. A high degree leads to the possibility to function separately from others and to the possibility to appear more autonomous.

In situations of conflict field-independent people

tend to make use of more specialized defense mechanisms like isolation, projection and intellectualization. Less field independence leads to the use of less specific defense mechanisms like regression and denial (e.g. Witkin et al., 1962, 1974; Witkin, Goodenough & Oltman, 1979). The contrast between the applied defense mechanisms is in accordance with the contrasts within the cognitive functioning. The defense mechanisms help to determine what will enter the domain of consciousness. Field-dependent people seem not to distinguish clearly between feelings on the one hand and thoughts and perceptions on the other. Absence of the distinctions correlates with the lack of possibilities to distinguish parts of the surrounding whole, both in the perception and in the experience of self and non-self.

The manifestations of field independence and the other constructs which are closely related to it, have important implications. People who can function with reference to themselves as a stable point of orientation which can be used in all circumstances have little need for external points of reference. It may be expected that these field-independent people tend not to use others as easily as points of reference as field independent people do. Witkin and Goodenough (1977b) presented an extensive review of the research done in this area. A number of studies confirmed the expectations. The situations in which people had to solve concrete, real problems offered the clearest results, as the study by Solar, Davenport and Bruehl (1969) demonstrated. Solar et al. (ibid.) had subjects do the R.F.T. in groups and found that relatively field-dependent people were influenced more clearly by others than relatively field-independent people. It became clear that the ambiguity of a situation is of importance. By a lack of structure the need for external points of reference becomes clearer and manifests itself quickly in the case of field dependence.

Field-dependent people are more dependent on external points of reference. We may expect then that they will look for situations in which these points of reference are at hand. Of necessity this will guide them to situations in which other people are present as they are the most important source of information. Witkin and Goodenough (1977a) provide manifold examples which support this expectation. Field-dependent people, relying more on external points of reference, appear to be more sensitive to social cues. They, for example, look more often at the researcher's face than field-independent people (Ruble & Nakamura, 1972). People who are field dependent are judged by others as having a preference for interpersonal situations and are appreciated in those situations. A possible reason for this, according to Witkin and Goodenough (1977a), is the tendency of field-dependent people to keep agressive feelings to themselves and hide them from others rather than letting them be known.

Witkin in his early studies worked together with Werner. In the subsequent publications e.g. Witkin and Wapner (1950) the influence of Werner's differentiation theory could be discerned. In the 1962 study by Witkin et al. the studies on field dependence-independence were integrated in the differentiation theory of Werner (1948, 1957). It is stated: (Witkin et al., 1962, 1974) "Development towards greater differentiation involves progress from an initial relatively unstructured state, which has only limited segregation from the environment, to a more structured state, which has relatively definite boundaries, and which is capable of greater specificity of function" (p 22). Witkin tried to place the several constructs like field independence, controls and defenses, body concept and sense of identity in a developmental context and conceptual framework. In a later study (Witkin & Goodenough, 1977b) the differentiation theory was revised and extended to encompass the new developments and insights on interpersonal behaviour, cognitive restructuring skills and even neuro-physiological specialisation. The latter topic illustrates how broad the scope of this approach, originally oriented towards individual differences in the perception, had become in a couple of decades. When Dawson (1972) and Waber (1977) showed a relation between aspects of psychological differentiation and lateralisation it meant that the first phenomenon could be traced back to a neuropsychological level.

The causes of the differences in field independence has been an interesting problem ever since these differences were found and especially since the many correlating variables became a research topic. In one of the most thorough studies, by Witkin and several of his co-workers (1962, 1974), much attention was paid to socialisation as a determinant of the differences in field independence that were found between people. Despite numerous studies devoted to this subject, many questions have remained unsolved until now. Another area of concentrated interest has been the question whether a, possibly innate, biological substratum could be found to be responsible for the phenomenon that some people were field independent while others proved to be much more field dependent. Although on several occasions evidence was found for a hereditary background, the exact proportion of the variance of the test scores that could be explained by this factor remained unclear.

An important development occurred when Berry succeeded in demonstrating the usefulness of the concept, which had become known under the name of "psychological differentiation", for cultural adaptation. In 1966 Berry published a study on "Temne and Eskimo perceptual skills". It was this study which demonstrated that the construct had an explanatory value and was broad in its scope. It appeared to encompass logical consistency, formal simplicity

and testability. We will turn to this topic in the next section of this chapter.

The manifestations of differentiation have been found empirically by, first of all, many correlative studies, some with an heuristic approach. Later on, more experimentally oriented and less exploratory studies confirmed the coherence, while some delineated the domain and set boundaries for what could be considered manifestations of psychological differentiation. Despite several occasions when accents were changed or other terms were introduced and used, the concepts of field dependence-independence has remained the terminology for the core of the evidenced degree of differentiation of a person (e.g. Span, 1973).

Finally we will describe briefly the model presented by Witkin (1977) in which the several concepts discussed so far could be integrated. He speaks about "the lines of a factor-analytic structure" (Witkin, ibid., p 24). The first level is "differentiation". On the second, one finds the self-nonself segregation together with field dependence-independence. On this same level segregation of psychological and neuro-psychological functions is placed. On the third level one finds both interpersonal competences and cognitive restructuring. This level reflects the dimension of field dependence-independence in the interpersonal and in the cognitive domain. It encompasses the result of the development of the self-nonself segregation. The outcome is either the development of cognitive restructuring skills or the development of interpersonal competencies. Field-independent people are more competent in cognitive restructuring than field-dependent people (Witkin & Goodenough, 1977a). Field-dependent people however show more interpersonal competencies.

1.2 Environment and Cognitive Style; Field Independence in Cross-Cultural Psychology

The determinants of field independence have been investigated in several areas, but probably most thoroughly in the domain of socialisation. This aspect will be discussed in chapter 6 but one general comment has to be made here. It has become clear from many studies in several societies and employing several research strategies that the family environment plays an important role in developing field independence in children. Furthermore it now seems likely that one general prerequisite is responsible for this development: an environment which encourages separate functioning in children (Witkin & Goodenough, 1981).

The variables investigated in the first studies in the cross-cultural domain and the most relevant to the differentiation theory were: obedience training, responsibility training, self reliance and general independence training (Barry, Bacon & Child, 1957; Barry, Child & Bacon, 1959; Minturn & Lambert, 1964, 1961). The findings could be related to the results of the study by Witkin, Dyk, Faterson, Goodenough and Karp (1962, 1974). The contrasting socialisation practices, indentified by Witkin et al., were comparable to the contrasting socialisation practices found in the cross-cultural studies. These contrasting emphases become clear in terms of their ecological value in different types of societies; each with its own roots in fundamental constraints: the physical environment (Berry, 1976, 1981). Food accumulation, the degree to which a community can accumulate or store food, had appeared to be related to the style of socialisation (Barry et al., 1957, 1959). The differences between low food accumulating societies and high food accumulating societies coincided with the differences in upbringing by the parents which seemed to determine either field independence or field dependence. The combined ratings on achievement and self-reliance and independence were related to low food accumulation which is a characteristic of hunting and gathering societies. Obedience and responsibility combined in the compliance index were features of high food accumulating societies: those that are agricultural or herd cattle.

The societies compared in these and later studies also differ in social "tightness" or put in the opposite way: "looseness". "Tightness" as defined by Pelto (1968) is the characteristic of a society which puts pressure on the individuals to conform. This conformity is directed not only towards political, social and religious authorities, but also to the society as such. This is achieved by an elaborate social structure and an elaborate role diversity: a well-defined system to put and keep every person in his proper place. Much freer are the members of loose societies who do not live under the constraints of such an elaborate social structure and role diversity. The stress on conformity, the dominance of the mother and the strict socialisation practices in tight societies result in a strong reliance on other people and an attitude of compliance. A vast body of research was reviewed by Witkin and Berry (1975). The general picture is that societies which stress conformity will stimulate field dependency. The stress on the conformity being detrimental to autonomous functioning, will result in a low restructuring ability. When tolerance, initiative and autonomy is stressed the members of a society tend to become field independent.

The basic points of view in Berry's series of studies are summarized and reported in his book: Human Ecology and Cognitive Style (1976). His paradigm is that behaviour is adapted to culture and culture in turn is adaptive to its

ecological setting: "To study the ecology of a phenomenon is to examine its distribution in relation to its environmental setting" (p 1). The phenomenon studied is cognitive style and notably field independence. The studies described are limited to groups of people who live near or close to the subsistence level. The fact that the group is able to survive but not able to make investments is crucial: e.g. "Farming groups accumulate food in order to provide subsistence between harvest seasons" (Witkin & Goodenough, 1981, p 94). It is stated that "it is among these cultures where adaptation to ecological press is most likely to be worth investigating" (Berry, 1976, p 1). It seems that under these circumstances the day-to-day life of the people concerned is most clearly guided by the need for survival. This implies that there is hardly any possibility for experiments, referring to those kinds of behaviour which are not fully guided by tradition and the outcome of which is not more or less guaranteed. Such an attitude of carefulness must have the effect that behaviour, both on a group and on an individual level, is highly structured. With this amount of structure it is likely that description and prediction of the behaviour is easier for the researcher.

It seems that on the other hand, when a community is no longer living on a subsistence level, the repertoire of behaviour broadens. In addition, a complicating factor is the fact that acculturation seems to have far-reaching effects on the behaviour of groups and individuals. (We will come to this topic in chapter 7.) Under those circumstances it is not astonishing that when the groups compared are different in several aspects, the picture of the relative position on psychological dimensions becomes very complicated (e.g. Berry, 1976; Mac Arthur, 1967, 1975; Witkin, Price-Williams, Bertini, Christiansen, Oltman, Ramirez & Van Meel, 1974).

Berry (1976) situates at one end of what he called the "ecocultural dimension" the nomadic hunting-gathering societies with loose social organisation and autonomy as the main focus of socialisation. At the other end are placed the sedentary agriculturally oriented groups with their tight social organisation and with stress on conformity as a main feature of socialisation and interpersonal relationships.

Berry (ibid.) demonstrated that there is a relation between the position of a group on the ecocultural dimension and the group's cognitive style. The latter is measured with the aid of tests of perception of the upright and tests of analysis and restructuring: the field independence-dependence dimension. The agriculturalists proved to be relatively field dependent. They showed low performances on these tests, while demonstrating conformity and stress on interpersonal relations. The hunters had less interpersonal competence but performed well on restructuring tasks. In this initial study Berry (1966)

selected two groups that were different in ecological characteristics and contrasting in the socialisation practices which were found to be of importance in the studies of Witkin and his co-workers. The Temne of Sierra Leone were one group, the Eskimos of Baffin Island were the other. With the aid of global observations, self-ratings by the subjects and a thorough study of the anthropological literature it became clear that the Eskimos seldom punish their children, allow them freedom and stimulate a high degree of self-reliance. The socialisation of the Temne child is rather harsh, physical punishment is common and children are forced to conformity. Social hierarchy and class distinction, an outstanding element of the Temne culture, are non-existent with the Eskimos.

The environment in which the two groups live is different and shows two extremes of ecological requirement. The Temne live in a bushy savannah type landscape which is varied in the sense that there is a diversity in colour and shape of not only the vegetation but also of the landscape itself. The Temne need not travel much and do not have to find their way in this environment in pursuit of food. Things are quite different for the Eskimo hunters who depend on their mobility and on their skill to orient themselves in space, not only for their food, but in fact for better survival. And this has to be done on a monotonous uniform terrain of endless snowfields. Berry matched two groups of Eskimos and Temne. In both groups a division was made between a subgroup living traditionally, and one from another community which was much more in transition to the western style of life. For reasons of reference he added two groups of Scottish subjects also from a more traditional and a more modernized community. In correspondence with his hypothesis it was found for both the traditional and the transitional Eskimo group that they were more field independent than the corresponding Temne group. The Eskimos and Scots did not differ significantly. Field independence was measured with two tests: The Embedded Figures Test (Witkin, 1969b) and Kohs Block Design Test (Kohs, 1923). (These tests will be described in detail in chapter 4.)

The more traditional groups were consistently more field dependent. An important problem in this first large scale study was that there are several variables which could have been of influence. Sierra Leone has much vegetation while an important feature of the Eskimo environment is it's barrenness. The Temne have a low protein intake (Dawson, 1977) while the Eskimo food consists of mainly meat and fish. The Temne are not known for their graphic art or sculpture while the Eskimos are famous for their soapstone carvings. In this respect it is worth mentioning that it has been shown that field independence is related positively to the degree of articulation of clay representations of the human body (Witkin, Birnbaum, Lomonaco, Lehr & Herman, 1968). This complicates the

picture as is shown when Harris' (1963) work is considered. He found that the degree of articulation of Eskimo children's drawings was higher than was the case for a comparison group of American children. The degree of articulation of a human body drawing is one of the expressions of field independence! (Witkin et al., 1954, 1962, 1974). The problem is: what are the determinants and what is an outcome? Realizing the many possible intervening variables, Berry over a period of years extended his samples until he could finally make a survey over studies executed with twenty one sample groups, including, the Cree Indians of James Bay, the Telefomin and Hanuabada of New Guinea and two groups of Australian aborigenes. The overall picture remained the same: "Cultural groups (and individuals) which are hunting and gathering in subsistence pattern, nomadic in settlement pattern, and loose in sociopolitical stratification emerge as clearly different in cognitive style from those which are agricultural, sedentary, and tight" (Berry, 1976, p 200). It is concluded that, "It is difficult to escape the conclusion, therefore, that the theory of psychological differentiation has been well supported by these cross-cultural studies" (ibid., p 214).

Yet there remained some problems. For example the mainly Canadian hunting-gathering groups and the hunting Arunta of Australia were not very field independent. The New Guinea groups are horticulturists who do not rely on mainly one crop a year in which they have to invest all reserves, as the Temne have to do. This all leads Barnouw to conclude: "Berry's contrasts, therefore, seem to be mainly between Canadian hunter-gatherers and West African farmers" (Barnouw, 1979, p 179). In preparing our fieldwork which was already finished at the time of Barnouw's criticism, we were guided by the same line of thought.

For the present study we wished to compare two groups who live in the same environment, but adapted to it in a different way. To test the hypotheses on the determinants of differentiation we needed groups living in the same geographical area. The Biaka pygmies of the Central African Republic were selected to be studied in contrast to the Bangandu. The Bangandu live in the same natural domain as the Biaka. The Biaka live in the forest during the wet season when they are hunting and gathering and at its border during the dry season or part of it. They live semi-nomadically. The sedentary Bangandu farmers live at the border of the forest where they have their plantations. Their social relationships are complex and show a clear hierarchical pattern. During the dry season they live in contact with the Biaka with whom they have a kind of symbiotic relationship. There is an exchange of food between both groups and the Biaka also provide manpower in exchange for goods. In general there seemed to be an excellent opportunity to check the hypothesis that the hunting gathering vs. the agricultural lifestyle is a determinant of psychological differentiation. There also seemed to be

a situation, where the roles of other variables, such as stress on conformity, acculturation and especially socialisation could be investigated.

During the pilot-work in the field it was decided that a third group would be added to the study. The reason was that we found the ecological and cultural differences between the Biaka and the Bangandu to be far less clear than we thought initially (Van de Koppel, 1977). The Bangandu gathered and the Biaka worked in the plantations part of their time! Only in the field could it be decided which group this would be because of several restrictions of logistical and political origin. The Gbanu, living further north of the area where the Biaka and Bangandu live, were chosen. They live in the savannah but in the same country with, among other things, the same lingua franca. They, however, live more towards the agricultural, sedentary pole of the eco-cultural dimension than the Bangandu.

Some final comments have to be made as to sex differences. Stewart-Van Leeuwen (1978) gave an extensive survey of the sex-role characteristics. In the completely sedentary farming groups, sex-roles seem to be quite different and sharply distinguishable. This goes together with an emphasis on obedience training for women. Obedience and compliance is not stressed in the small mobile hunting and gathering societies. In these groups the fact that there is less role diversity and that the sex-roles are less sharply segregated, leads to an independent position of the women. Their contribution to the economy is as highly valued as the work the men do.

Our study seemed to offer a possibility to check this hypothesis and to see if we could find a similar differential pattern in the forest context where we worked.

1.3 Biaka, Bangandu and Gbanu: Expectations on the Differential Degrees of Field Independence

The first purpose of this study was to test the hypothesis that the Biaka are more field independent than the Bangandu. Several tests were employed which reflect different aspects of one and the same construct: field independence.

The expectation regarding the Gbanu is just an extension of what was hypothesized for the two peoples mentioned. On the continuum of field dependence-independence we expect them to have a position tending even more to the field dependent side than the Bangandu.

The reasons for these expectations have been outlined in the preceding section in a global way. In chapter 2 the ecology of the Bangandu and Biaka will be described and

arguments in support of the expectations will be adduced. In chapter 8 we will present extensively the results on the various tests for several combinations of groups.

This kind of presentation of the test results is not the ideal one. We would have liked to present one large matrix of results on all five tests with the four independents: culture, with three levels, and sex, age and western schooling with two levels each. As will be outlined in chapter 3 this approach was not possible. Simple lack of time was one of the reasons for this, but the main problem was the virtual absence of subjects for several of the cells of this matrix.

It is clear that with regard to the dependent variables, the cognitive style tests, not all samples are independent. An important group of subjects is formed by the families, of which the father, the mother and a child were tested. Analyses of variance seemed the most plausible technique to search for differences between groups. An assumption underlying this technique is, however, the independence of samples. This is not guaranteed in this case as it is likely that field independent parents have field independent children (e.g. Corah, 1965; Hartlage, 1970). It is also not unlikely that the variable of field independence plays a role in the choice of a partner. We come back to these two topics later on in chapter 8, when we compare the results of fathers, mothers and children.

Sex differences in cognitive style have been found in many studies, which led Witkin (1967, p 243) to conclude: "Boys and men tend to be more field independent than girls and women. The differences between the sexes are small in magnitude, compared to the range of individual differences within each sex, but are clear-cut and pervasive." He already pointed to the fact that neither Berry (1966) nor Mac Arthur (1967) found these differences for the Eskimo. This is considered, however, to be an exception to the consistent picture.

It is suggested that the emphasis on compliance in the socialisation, which seems to be related to the development of a global cognitive style, is often more present in the socialisation practices towards girls than towards boys. The Barry, Bacon and Child study (1957) is referred to as an illustration that "in a large number of cultures, mainly illiterate, men typically engage in activities, such as work and combat, which stress self reliance and achievement; women in contrast have the nurturant role of home-making and child-rearing" (Witkin ibid., p 244). It is overlooked that in many African settings and especially, as it seems to us, in the agricultural groups women do both the home-making and the child-rearing plus a large part, if not the largest part, of the "work". Yet in the African settings sex-differences have been demonstrated in many studies among which those of the authors just mentioned (Berry, 1966; Mac Arthur, 1974).

Stewart-Van Leeuwen (1978) discussing several reasons for the existence of sex-differences in field independence among the sedentary, high food-accumulating groups suggests an explanation "which has been barely alluded to in the differentiation literature, but which has considerable support from anthropological sources" (p 99). As she points out, the role-diversity is kept to a minimum, required by the simple survival in the case of the small, little socially stratified, hunting-gathering societies. It is however not so much the task distinction, which was, as we saw, stressed by Witkin (1967) but the value of the women's contribution. This is an important point: "the great respect or value necessarily ascribed to the women's relative contribution leads to fewer demands for unquestioning obedience and a consequently greater sense of separate identity among the women, both of which will facilitate more differentiated perceptual, cognitive and socio-emotional functioning" (p 99). She points to the fact that Barry et al. (1959) found a high correlation among food-accumulation, strength of socialisation for compliance and the degree of the women's participation in the major subsistence activity, that is, the work in the fields. The point seems to be the value attributed to the women's work!

There is probably no need for the entire economic model, the author proposes, to account for the differences between the sexes. She describes "three relevant mechanisms by which this economic model might operate" (p 11). The mechanisms are, (1) the male-female strength differential, (2) the adaptive selection towards greater social sensivity which is correlated with the change from nomadic to sedentary life, and (3) the lower value of women's work in the sedentary, high food-accumulating societies. We tend to think that there is a more parsimonious model: the value assigned to each person's contribution to the survival of the groups and the resulting degree of field independence to which he or she is guided. It could be that there is an optimum size for hunting-gathering bands with only a very small margin between being too small to survive and too large to feed the members. In the next chapter the Biaka hunting groups depend on all the individuals they encompass, both men and women, for their existence. For the sedentary farmers this could be much less obvious.

This leads us to hypothesize differences in performance between the sexes for the Bangandu, both for adults and children. It is likely that the men will be more field independent than the women and the boys more field independent than the girls. When, however, comparing the Biaka males with the females, we hypothesize that the men will not be more field independent than the women and the boys not more field independent than the girls.

A final topic to be discussed briefly here is the difference in field independence over the years. Several

studies, both longitudinal and transsectional ones (e.g. Witkin et al., 1962, 1974; Witkin, Goodenough & Karp, 1967; Faterson & Witkin, 1970) have demonstrated a gradual increase of field independence over the years until the mid-teens. It seems that with adulthood there is constancy in performance on the several tests of disembedding, restructuring skills and autonomy in interpersonal situations. It is clear that children are more field dependent than adults. Older children are more field independent than younger ones. The picture is somewhat obscured when several cross-cultural studies are compared. A clear and uniform development over the years cannot be discerned (e.g. Witkin & Berry, 1975). It will be interesting to see if for the groups involved in our study differences will be found in the test performances of adults and children. This is not an a priori expectation. It could be that especially for the Bangandu, who are thought to be relatively field dependent, the differences between children and adults will not be found. It is not unlikely that there is a kind of optimum degree of field independence which is induced by the ecology and the adaptation of the group to it. This could imply that already at a younger age the optimum is attained and no further challenge to develop disembedding and restructuring abilities is present. For the Biaka, who are expected to be more field independent, there could well be a continuing growth or development towards field independence until a later age. This would result in finding no differences between adults and children on the tests for the Bangandu and significant differences for the Biaka. It is this pattern which we expect to find.

The level of western schooling is related to the performance on tests of field independence. This is found already in Berry's (1966) early study with his Eskimo- and Temne samples. Wober (1966) found significant correlations of the Kohs Blocks (shortened) and Embedded Figures Test (shortened) with degree of education but did not find the same effect with his (modified) Rod and Frame Test. In many other studies moderate to high correlations were found between test performances and schooling (e.g. Berry & Annis, 1974). Witkin & Berry (1975) concluded (p 69): "The pattern is thus clear; experience of education does relate to differentiation task performance, while other covariables appear to contribute as well." This reference to covariables is made as it appeared that the pattern is obscured by variables which often go together with education, in the sense of western schooling, but are certainly not the same. In group comparisons variables like wage employment, the use of a western language as a second tongue and general economic development of the group, appeared to play an important role. Estimating the effect of education as a separate variable is difficult.

In our study we will try to discern the effect of schooling by comparing some groups which have main vari-

ables in common like age and sex, but which differ in this respect, that some groups have received western schooling, and other groups have not. Besides, the correlations of degree of western schooling, in number of years of schooling with field independence, will be interesting to look at. In general we expect that the groups with schooling show better performances than the groups without schooling on tests of field independence. In relation to this we expect to find within the groups of people with schooling, a positive correlation of the number of years of schooling and the results on the tests.

CHAPTER 2: THE FOREST SCENE

2.1 The Biaka Pygmies

There are several groups of Pygmies living in Africa. The two largest groups are the Mbuti who live in the Ituri forest in what actually is the Republic of Zaire, and the Biaka living in the large rainforest which expands from the Lobaye river into the Peoples Republic of the Congo and into Cameroun. Some smaller groups live more or less scattered over Central Africa, but even the very small groups living in the savannah are always close to some small forested area (Cavalli Sforza, 1971).

There are reasons to believe that the rain forest is a last resort of the Pygmies who in the past were confronted with the expanding Bantu-speaking tribes coming from West Africa. Their situation is comparable to that of the Bushmen living in the desert areas of Southern Africa. It can hardly be accidental that their habitats are rather hazardous and unfriendly regions, the one being swampy for at least part of the year and the other extremely dry.

Cavalli Sforza (ibid.) describes how he and his coworkers made genetical comparisons of "standard African" being "a pool of W. Africans and Bantus", Bushmen and two groups of Pygmies: the Mbuti and the Biaka of the Central African Republic. For the Mbuti, the Bushmen and the "standard" Africans separation times of each group from the others of about 15.000 years were calculated. It is suggested that this would probably point to a relation with two extinct cultures: the Stillbay and Sangoan. It is stated however that "the identification of those extinct cultures with present inhabitants of the same region is still uncertain" (ibid., p 85). The Biaka were found to be genetically closer to the "standard" Africans than to the Mbuti Pygmies. For the hypothesis that the Biaka are in fact an admixture of the original Pygmies, of which the smaller Mbuti would be more direct descendents, and the "standard" Africans, little support was found. It is concluded that the Biaka (called Babinga) and the Mbuti separated a long time ago; long enough for the Biaka to develop their own genetic polymorphisms. If a mixture has taken place it must have been in the past: "if a mixture has occurred, much time has since elapsed. This corresponds with the fact that no gene flow into Pygmy populations is observed today" (ibid., p 86).

According to Turnbull (1965a) the people of the non Pygmy tribes around the Ituri forest do in fact fear the forest. They are reluctant to venture into it. This seems not to be true for the peoples in the Lobaye region, who live in contact with the Biaka. Nevertheless, in this region and in the enormous area south of it, the number of permanent settlements is small, and the size is usually

very modest. There is no proof that these villages are very old. It could even be that, at least for the Lobaye region, they are not older than the beginning of this century with its furious revolts against the suppression by the colonial power. In 1928 tribal wars started between the Isongo coming from the north and the Bangandu who came from the south-east (Bahuchet, 1979). It is possible that some of the clans that fled into the forest, stayed there afterwards.

The oral traditions of the Bangandu tell about their coming, about three generations ago, from Impfondo, a region in Congo west of the Oubangui in the forest. This would mean that the Bangandu came to the Lobaye region in the last part of the 19th century. A number of them stayed in the forest near the Motaba river, at a place situated about 150 kilometers south of Bangandu, as the crow flies. The Bangili to whom this seems to refer (Berry et al., in preparation), do live in the forest and fish, hunt and do a little gathering but how long have they lived there already? There are villages in the forest, but there do not seem to be any that are both deep into the forest and are not situated on a riverbank necessitating dependence on the forest ecology. We shall turn to the Bangandu and their adaptation to the ecology of the forest in the next section.

The Biaka pygmies of the rain forest are hunters gatherers depending for their subsistence on their habitat, without investing in it in terms of agricultural or herding activities, like sowing and manuring. There are only a few more groups in Africa who live in this way: the Bushmen in Southern Africa (Lee & Devore, 1968) and the Hazda and Dorobo of the East African savannah (Woodburn, 1968, 1982). The way these peoples practice their hunting and gathering activities is not the same, the landscapes being so different. The Bushmen can pursue game for a long time, following the tracks to finally capture it (Lee, 1979). The Pygmies often capture the game by surprise and the rainforest offers far fewer possibilities to hound down animals, except for the large and relatively slow ones like the elephant and the chimpanzee. This kind of hunting is mostly limited to a part of the year, the rainy season. When it takes place it is an activity of a small group of five to ten or twelve hunters who receive important help from boys of about twelve years and older (Bahuchet, 1978). The hunting by the Bushmen seems to be much more individual, only one to three hunters generally effectuating the difficult and arduous pursuit of the game (Lee, 1968).

An important way of hunting for the Pygmies is net hunting. Several kinds of net-hunting have been described for the Biaka (Bahuchet, 1979) which have one general characteristic: the game is driven into vertically stretched nets and killed. According to Bahuchet this way of hunting is essentially a collective effort and one

needing the participation of a large number of both hunters and beaters. He estimates (ibid., p 238) the ideal number to be around twelve hunting nets and thirty people. The game consists mainly of several kinds of antelopes. The author indicates that it is a way of hunting which is of importance socially, as it is the only one which needs and leads to the assembly of camps.

There are two main points here: firstly, all the people are needed and cooperate in this hunt: males, females and children, and secondly this cooperation of the entire primary social units, the camps, is essential. The Biaka camp as a primary social unit was already known to researchers some decades ago (e.g. Hartweg, 1952). Hartweg estimated the mean number of inhabitants of a camp to be about forty. The camp is a patrilineal organized unit of several nuclear families. One of the oldest and most influential men could be called the chief. It is, however, no exception at all to have more than one leader in a camp one of which can be the witchdoctor, or the most renowned hunter. Hartweg (1952) speaks about "l'autorité indiscutée d'un chef en principe héréditaire qui est à la fois le juge, le maître des chasses et le prêtre" (p 105). It could be that this reflects a situation from the past which no longer exists. This is not very likely in so short a time. It is also possible that the author was influenced in his interpretations by the very strict hierarchical organisation he may have noted for the other cultural groups like the Bangandu. Anyhow recent observations (Demesse, 1976; Berry et al., in preparation) point to a very egalitarian and very little structured social organisation within the camp although a certain authority of the leaders is likely.

Hartweg (1952) made an interesting observation. When the, what he called, optimum of around forty people in one camp has been passed and the camp is reaching a number of around one hundred, it splits and two new camps are formed. This phenomenon of an optimum size of a camp, was observed as early as 1911 by Reynault. This author interpreted it, however, as being a function of the, what he called, symbiotic relationship with the villagers. Too many hunters in one band and belonging to "un autre clan" (Regnault, 1911, p 287), would make a distribution of the game necessary. The author is of the opinion that for the "Babinga" the family is the social unit. It is such a unit which has a relationship with a certain villager. Providing many families with goods would exhaust the possibilities of this villager. On the other hand too many hunters would mean dividing the game among, too many people, who would have to satisfy the demands of their "owners". Anyhow, different ways of reasoning come to one and the same conclusion: there is a particular optimum size for a camp.

We observed ourselves how in a dry season a camp of

about thirty-five people split up into two groups. The reason did not become clear, but it was suggested by our assistants that a quarrel had taken place. When we, however, asked if this was a definite arrangement, we were assured that it was purely temporary. Before going away for the hunt in the beginning of the rainy season the two groups would "of course" reunite. During several months, however, the two camps lived some kilometers apart and there did not seem to be very frequent contacts. Demesse (1976) observed that the number of hunters in one camp usually stays well below twenty. He concluded that when this number was exceeded considerably, the amount of game that could be caught did not become larger proportionally to the number of people.

It could well be that for the Biaka there is a certain size of camp which is limited to rather narrow boundaries. Another indication of an optimum size is the fact that the exogamous marriages of the camp members, who are often very closely related, are organized in a certain way. When a bride comes from another camp, an exchange is usually made where another bride takes the "open place" as compensation (Demesse, ibid.). Before the marriage takes place the young man stays with the camp of the girl for a certain period. The length of this period differs and usually seems to be about a year. The aim is that he should provide the camp with food and goods during this period of bride service.

It should be concluded that there is support for the idea that the value of each person's contribution to the survival of the camp is so high that each role, including that of the women, is considered to be of the same importance. A consequence could then be that every child is socialised towards personal responsibility and autonomy.

The Biaka do not know special artisans. Each man makes himself all the things he needs, like a hunting net and an axe, and everybody uses only what he makes himself. Metal tools are obtained from the villagers. The work of each person in a camp seems to be seen as having equal importance. This does not mean that there is no role diversity at all. Some activities are the men's: the hunt with a spear, climbing the trees to collect honey and the healer's work. The women prepare the evening meal, often aided by the children, both boys and girls. The gathering activities which take place at any time when not in the camp, are also mainly the women's work, although the men do gather snails, beetle larvae and the like when they spot them. We tend to think that the role division is much less sharp than in the Bangandu villages. We shall give an example. The period of the preparation of palm oil is at the end of the dry season. In the village it is the women's work. The Biaka prepare oil for themselves and for the Bangandu to take with them into the forest when they are collecting caterpillars. This caterpillar season is important for both Biaka and Bangandu. When the oil is

prepared in a Pygmy camp it is remarkable to notice how the children perform their tasks. When possible boys and girls of about eight to nine years old help prepare the oil and provide the meals. They cook the food without needing to receive any instructions and take the meals to the women who only interupt their work for eating. The women are helped by men who for example throw baskets full of nuts into the large cooking pots and empty the steaming hot contents of these pots into the mortar. The women chat with each other and with the men. The children talk freely but are quiet and the whole scene has a smoothness, as if one is watching a kind of performance where everybody knows his role perfectly and no orders are needed.

When watching the interactions of parents and children two important observations can be made. It is noticed that much interaction between parents and children, and especially the very young children, takes place. Also the absence of aggression is striking. The Biaka baby is never alone. It is carried by the mother by day and sleeps close to her during the night. When the presence of the baby is really hindering the woman in her work the baby is given to someone else, usually to another woman or older girl, but possibly to a boy or to the father. We often observed fathers or boys caring for a baby and playing with it. When the child is able to crawl or walk it is given stimulation by playing and having it crawl or walk to the mother or another person. Sometimes a row of sticks is placed in the ground for the child to practice walking and in many camps one can find a simple swing made for the children. They are given so much freedom that they sometimes run serious risks. Young children can be seen playing with large knives and already at five or six years of age they sometimes help their mothers cutting leaves into small threads for the meal. As a result, it is not uncommon that one sees a young child missing a part of a finger. It is also reported that sometimes children die after falling into the fire (Hewlett, Van de Koppel & Van de Koppel, in prep.). Young boys of about eight years old have their own spears for hunting animals like the palmrat. The girls have their own carrying baskets, the same ones the women use, but smaller. Like the women they often go into the forest to collect or pick up what they find on their way, putting it in the basket, like mushrooms and fruit. Physical punishment of children like hitting is unknown. Children are of course sometimes reprimanded, but in a very quiet way. We once observed how a boy of about nine years old kept taking from the food his mother was preparing. A short snarl was sufficient to scare him off and have him go away. Usually the interactions with children are friendly. We do not have the impression, however, that the adults talk very much to the children when things have to be learned. Much teaching and instructing seems to go by imitation.

Already at an early age the children have much independence. The children are free to go and stay everywhere in the camp. The toddlers are allowed to play near the camp. They are quietly corrected when their play seems to be too dangerous like tumbling down from slopes which are considered too high or otherwise unsafe. The Mbuti Pygmies are described by Turnbull as being extremely peaceful. When a conflict threatens to burst out often the tension is turned into humour to drop the matter (Turnbull, 1965a). The same description of kindness and peacefulness is unanimously reported for the Biaka. There are certainly sometimes manifestations of violence, but there is no proof of real regulations or institutionalized social control. The same is true for the socialisation of the children. There are things which are not allowed, but the overall feature of the upbringing of the children is freedom.

It could be that the boys have more freedom than the girls. It is possible, however, that this impression is due to the nature of their activities. The girls assist in cooking the meals. A girl of about ten is usually quite able to do this on her own. Usually however she helps her mother when the women prepare the meal near the end of the day. Each woman prepares the meal for her husband and children but usually all the women of one camp do it at the same time and sit rather close together. It is a social event and there is much talking. The children join in the discussions. The boys of the same age as the girls who do the cooking already hunt on their own. At that time of the day they can often be seen coming home in small groups armed with spears, which indicates that they have been hunting palm rats and other small animals.

The children live in their own huts from an early age. The babies sleep with the mother but when the child is three to four years old it shares a hut with other children. Round the age of puberty the girls share a hut with one or two other girls and the boys with one or two boys of about the same age. Once married the young couple have their own hut. The huts are very simple and are in fact only used as a shelter against the sun at midday, when it rains and during the night. The bed consists of some logs. There is no other furniture. A simple shelf made of sticks, which is mainly used to prevent dogs from stealing the food, serves to store the kitchen utensils. It is usually placed outside the hut.

When the camp decides to go to another place things are packed quickly. Possessions are carried in the baskets of the women. The hunters carry their hunting nets, spears, crossbows and axes. The drums are sometimes left in the village in the huts of the Bangandu. Usually the fire is also transported. The Biaka can make fire with a piece of metal and a stone but usually the women prefer to carry some glowing pieces of charcoal packed in leaves.

The Biaka like visiting other camps. The unmarried young men often go to another camp and stay there for a few

days. Children, and especially the young boys from about ten years old, also pay these visits. It is not uncommon for a boy to stay in another camp with relatives or to go out hunting with people from another camp for several days. The age of marriage for the men is usually in the early twenties. It is essential that the man has proved to be capable of maintaining a family. This means that he has to be a hunter. The very few young men we saw that were crippled or obviously chronically ill were not married. The girls marry at a much earlier age. One of the children in our sample married at the age of eleven. There was some merriment in the camp when we were told that she had married some days before. We were assured, however, that this was quite allright. The girl wanted to marry and, as we were told, animals do not ask if it is allright to marry either! Sometimes girls marry at an even earlier age. We met a man who had married a girl of nine years old. She was the sister of his first wife who died. The girl took her place. The man confirmed that she was "really his wife" and that he had intercourse with her. Our assistent commented that this was not exceptional but that for the Bangandu this would be punishable. "Pygmy children are much more like adults", he added.

Woodburn (1982) in a recent study describes how: "Greater equality of wealth, of power and of prestige has been achieved in certain hunting and gathering societies than in any other human societies" (p 431). It is remarkable how strong the resemblance seems to be between the Hazda and the !Kung he describes and the Biaka Pygmies. As in the egalitarian societies he describes, the equality of the Biaka is asserted, and not the "mere absence of inequality or hierarchy". By their way of living, the semi nomadic style of moving from one temporary camp to another it is impossible to have and keep property of any importance. The Biaka do not have the possibility of accumulating property and in this way dependence cannot be created. It should be noted that in one of the few cases of homicide reported to us (Hewlett et al., in press) jealousy played a role. The victim owned an old French army kepi. In the other cases the reason was that someone had not shared the meat of his game with the others in his camp. Woodburn illustrates the fact that there is no basis for exclusion of people in the Hazda society with the full acceptance of the lepers who are treated exactly like the other people. The same is true for the Biaka. Those who, due to old age or illness, depend on others, are not excluded and are not treated in any special way.

It is this background of equal value, e.g. their equally respected contribution to the camp's survival and existence, enabling people to make their own independent decisions, which led us to believe the Biaka to be field independent people.

2.2 The Bangandu

In the previous section of this chapter it was already indicated that the Bangandu villagers are relative newcomers in the Lobaye area. The history of the Bangandu has been studied by Bahuchet (1979). He reconstructed the period of the arrival of the Bangandu in the Lobaye region and describes their relations with the French who exploited the region for palm oil and rubber. The forced labour was probably a reason for the Bangandu to become more oriented towards agriculture than they used to be. Their main food used to be bananas. It is likely that they could spend more time hunting before they were under the control of the central government. Now the main food has become manioc. They were stimulated, if not forced, by the French to cultivate manioc in large quantities to feed their workers and soldiers who were stationed in their region. Manioc has remained the main food for the Bangandu ever since. Manioc is relatively easy to cultivate and the yield is high when compared with bananas or maize. One sees many people with goitre among the Bangandu. This seems to be due to the way the manioc is prepared (Ermans, Van der Velden, Kinthart & Delange, 1973). The poor way preparation, not soaking the roots suffiently, probably reflects the late introduction of this food. Plantains and sweet bananas are also cultivated but serve as complementary food. The maize is often used to prepare alcohol. Some kinds of leaves are eaten as a vegetable but the quantities prepared are usually small. There are Bangandu who hunt and we met one man who claimed to be a professional hunter. Regularly animals are trapped or snared. Yet the quantities of meat consumed are very limited. The smoked meat which is received from the Biaka is sometimes eaten but quite often it is used as merchandise. Much of this smoked meat, mainly of antelopes, is transported to Mbaiki and sold to the people in the town.

The way in which the Bangandu do their farming is the original slash-and-burn technique. In the beginning of the dry season an area in the forest is cleared. Shrubs and trees are cut down. When after about two months leaves and wood are dry the field is set on fire. Very big trees are often not felled but only killed. Cutting the trees down is done by the men, the rest of the work is often done by the women only, helped by the Biaka. Many of the Bangandu have a, usually rather small, plantation of coffee, the crop of which is almost exclusively a cash crop. The work for the cashcrop is mainly done by the men but at the time of the harvest all help is needed including that of the older children.

Besides the work in the fields the women also have to fetch wood and water. Both are very time consuming. Good firewood, called white wood, which does not give much smoke, has become scarce in the proximity of the village.

It has not only to be chopped but also to be transported in a basket on the back. All the water needed for the household also has to be carried homeward from the well. This is often a distance of several kilometers. The preparation of the meals is time consuming and is fully the women's work. The whole compound is swept daily and clothes have to be washed in a remote brook.

Much help is received from the girls and especially the girls of about ten years and older. They can often be seen caring for a baby when the mother is busy, but also sweeping and even chopping firewood. The boys do not have many responsibilities. Those who are at school are busy with their schoolwork part of the day and can sometimes be seen clearing the ground around the school. At home they usually play or try to shoot birds with catapults. They also go out trapping and snaring. We do not have the impression that they are often succesful when hunting in this way. Sometimes they go out hunting with some adult Biaka or Biaka boys. We were told that it is not uncommon for a man or a boy to fetch water when a woman is ill but we never actually saw it happen.

The Bangandu are polygamous. Each woman has her own hut in the compound of her husband. She prepares the meals for herself, her children and her husband, when it is her turn to cook for him. There are rules for the husband as regards the time he spends with his spouses. A man with two women usually stays two days and two nights with one woman and then goes to the other one. The women are not fully submitted to their husbands. A man who arrives too late for diner or whose wife is in a bad mood or jealous runs the risk of finding no meal ready. The women also decide themselves when and for how long they will make a journey to visit relatives. Some women, besides receiving some money from their husbands from time to time, have small earnings of their own. Often this money is received for the local alcohol which is distilled by the women. A fair amount of alcohol is sold to the men who do not only drink it themselves, but also give it to the Biaka who work for them. The women do drink of the alcohol they prepare. The palm wine which is collected by the men towards the evening is usually drunk by themselves.

We do have the impression that the roles are rather strictly divided between the sexes. The men collect the palm nuts from the trees but the women prepare the oil. When a hut is built the men construct the frame and the roof but the walls are plastered with clay by the women. Among the men there is professional specialisation. Most men call themselves planters or farmers but there is also a carpenter, some healers, a blacksmith and some fishermen. Some combine being a farmer with activities like hunting with a gun, making baskets in order to sell them and selling paraffin .

The hierarchical organisation of the community is very

strict. According to Bahuchet (1979) the Bangandu settled in the Lobaye regions as clans. Some clans arrived later than other ones. At least one clan in the community is originally Isongo. Although closely associated with the Bangandu, the Isongo have kept their own language but also speak Dingandu, the language of the Bangandu. It was an Isongo, Lamine Albert, whom the French appointed Chief of the Bangandu around 1920 (Bahuchet, 1979). He was described as being a very powerful man. Although still living when we did our field work he had had three successors who all died. The Bangandu no longer have a chief. The community is now guided by a mayor and council. They are aided, however, by the several chiefs of the villages who are in fact the leaders of the several clans. They have much authority and are the judges when disputes have to be settled among the inhabitants of the villages. Within the families there is also a strict hierarchical organization. The eldest member of the family has a great deal of authority, but even among brothers, halfbrothers and nephews, there are strict rules concerning the exertion of power. To give an impression of the often subtle ways hierarchical organization is demonstrated, it could be noted that there are at least four different ways of shaking hands. Each way has its social connotation and illustrates the social position of the one person in relation to the other. (One can easily imagine how for a researcher staying in the region errors in this respect can have important repercussions not only for his personal regard but also for the work he is doing.)

The way parents socialize their children is rather authoritarian. One seldom observes signs of affection for the children after weaning. Children are often snarled at and beating a child is not an uncommon phenomenon. Not only the parent but also other adults often scold violently for unwanted behaviour. Sometimes one even gets the impression that a certain neglect is present. We noticed on one occasion that medical aid for a tropical ulcer, which could have been asked for without any difficulty at other times, was asked for at night. The excuse for the clearly inappropriate time was that the child's crying prevented the parents from sleeping. On the other hand we witnessed how a very young boy was shaken hands with and thanked by many adults after having shot a black kite (milvus migrans) with his catapult. The appreciation of his achievement of killing this bird, which is notorious for stealing chickens, was very great and clearly demonstrated.

A similar phenomenon to what we observed in relation to this boy seems present, to a certain extent, with the adults: performances seem to define to a large extent one's prestige. Income is also important. Among the most respected villagers one was a veteran of the French army. He received a pension which was enormously high compared to local standards. Another man with high prestige was a

former policeman from the capital. However, the main determinant of one's prestige seems to be descent. Among the most respected men in the community there were several of the twenty-three sons of Albert Lamine, the former chief of the Bangandu. There are also some lepers in the community. They are not ostracized as happens in so many societies (Woodburn, 1982). Their individual situation was different. One elderly married man seemed to be rather well-to-do compared with the other villagers. Another, a young man, lived as a bachelor with his parents. He and the parents lived in very poor conditions. Although even a part of their hut had collapsed they seemed not to receive help. We observed that some other old and disabled people lived in very poor conditions. It did not become clear what the reason was why they were neglected. One old widow did not receive help, yet her son was one of the most well-to-do men of the community.

Compared to the Biaka, the Bangandu have many conflicts, quarrels and feuds. The village chiefs spend many days sitting in judgment upon complaints from one person against another. More important offences and crimes are handled on the community level or reported to the police of the provincial capital M'baiki. During our stay in the village of Lotemo a young man came home from prison after serving a sentence for a "pornographic" painting on the outer wall of his hut. In Bagandu a man was accused of "sending snakes", causing several cases of a fatal snakebite within a short period. He refused to drink the "kadi", a medicine which would prove his guilt if he died and his innocence if nothing happened to him. He obviously did not want to run the risk, refused to drink and was sent to the M'baiki prison to appear in court. Although most Bangandu are said to belong to a religious denomination, many conflicts have to do with witchcraft. Accusations of adultery are also frequent but most problems seem to be caused by accusations of violating other peoples' rights. (Women, by the way, seem to be regarded as a kind of property. We were shown an official, recent document describing what a man inherited from his father. Among other things it mentioned: two women, two guns and a certain number of sheep.)

It may be that the impression is given that the Bangandu are individualistic or even selfish people. This is not true. There is also solidarity and cooperation. Especially the women do many things together and do it in peace. The children are friendly and often very helpful. The young men often have close friendships. Even the women in a polygamous family mostly have a cordial relationship. The introduction of a new wife sometimes leads to quarrels but mostly the women calm down soon when the advantage of sharing part of the work becomes clear.

In chapter 1 the possible determinants of field independence were described. Several determinants of this

cognitive style were described in a general way. The characteristics of cultural groups, which lead to a certain cognitive style, were derived from the existing literature and summarized.

We hope to have made clear in this chapter, that there are many characteristics of the Bangandu society which are in line with the determinants described to the development of field dependence. When compared with what was told about the Biaka there are differences, pointing to field independence as a feature of the Biaka and field dependence of the Bangandu. In the next section we will see, however, that this picture is greatly complicated by an important feature of both societies: their close relationship.

2.3 Forest Dwellers and Villagers

The Pygmies have a close and remarkable relationship with other groups. This phenomenon has been described by many authors for the Mbuti of the Ituri, for the Biaka and for other groups (e.g. Schebesta, 1940; Turnbull, 1961, 1965a, 1965b; Julien, 1956; Regnault, 1911; Demesse, 1976; Poutrin, 1911).

The descriptions of the associations between the groups and between the individuals, clans or families within these groups differ and seem to range from exploitation of the Pygmies by a neighbouring tribe to an economic relationship in the interest of both. It is likely that the situation differs from one locality or one group to another. For this reason we will not try to give an overall picture, not even for the Biaka in general. We shall limit ourselves to the situation in the Bangandu area and the relations between the Biaka and the Bangandu who live there.

There is an exchange of Bangandu goods for labour and food from the Biaka. Bahuchet (1979) is of the opinion that the relations between the Biaka and Bangandu go back a long time. The actual situation would be the result of a slow evolution. The first person who mentioned that "dwarfs" provide ivory to other Africans who sell this to the Portuguese is Dapper in 1668. It should be mentioned, however, that ivory never seems to have been of interest to Biaka or Bangandu, it simply was not used. Europeans, however, already visited the Lobaye region around 1892 to buy ivory. In 1902 the French imposed their "taxes" on the Bangandu people, to be paid in rubber, ivory, meat and other goods (Bahuchet, 1979). These things must have influenced the relation between Bangandu and Biaka. It is not known if the French ever tried to obtain goods directly from the Pygmies themselves. It seems unlikely. The Biaka could hide in the forest easily and avoid any contact with

the colonial power. Even nowadays they sometimes back out of their responsibilities towards the Bangandu. We were told that when the Biaka of an "owner" is dissatisfied he disappears. The word "owner", which seems to be the best translation for the terms the villagers use, indicates one special man with whom one or more Biaka have the relation of exchange. There is a unique exchange between them. The Biaka cannot go to someone else, except to the sons of owners who die. When the Biaka is dissatisfied he goes into the forest and stays away. There is only one thing the villager can do. He has to find the Biaka, which can take several days, and provide him with gifts. If he is satisfied as to the amount and nature of the gifts the Biaka may consider to come back. They do not come to the village in any given time however. There are special periods in which they stay in camps near the village for some weeks or months. Although it was thought initially that the Biaka pass at least part of each dry season near the village to help the villagers make the clearings for the gardens, this does not seem to be true. Bahuchet (1979) speaks about the tendency to a two year cycle. The course is as follows. In the first dry season from December to March camps reunite for collective hunting. Then the camps in their entirety go their own way for hunting and gathering of honey in small groups. When the first rainy season starts the camp members hunt with spears and crossbows. In August the caterpillars, which can be collected in large amounts, are consumed. When the caterpillar season is over, there is a period of hunting and trapping, often together with villagers who also come to the forest for the caterpillars. The second dry season is spent at least partly in the camps near the villages for the Biaka to be able to work in the fields. They then go back to the forest to hunt as separate camps and small groups until the following caterpillar season which is spent in the camps that stay on their own.

The Biaka provide the villagers with smoked meat. The game is divided into pieces and smoked to conserve it. Villagers often travel into the forest to the region where "their" Pygmies can be found hunting. A four day's march is not uncommon to reach them. On the way back the meat is transported by women in baskets or by men packed in bundles and carried on their backs. It is not uncommon for one or more people to stay hunting for some time with the Biaka. The work the Biaka do in the dry season is mainly the clearing, slashing and burning of the fields in the forest. They also help maintain the coffee plantations. Not only the men work for the "owners" but also the women. Several kinds of services are rendered, like transporting. On several occasions we met a group of Biaka males who carried bamboo from Loko to Bangandu to be used for making the roof of a hut in the village. The Biaka, despite their heavy burden, were usually in an excellent mood as a result of the bottle which had been passed around during the stops in

one or two villages on their way. The Biaka men like alcohol and receive it rather often from the Bangandu. They make palm wine themselves but sometimes in a rough kind of way by cutting a tree instead of draining it carefully in the way the Bangandu do. The practice is frowned upon, each tree in the proximity of the village having an owner who has his claims on the area it is growing in. The Biaka receive food from the plantations of the villagers. Manioc, plantains, sweet bananas and palm nuts are the most important products which are given. The goods are given but also asked for. We were told that the distinction between receiving, taking with permission and taking without consent is not always clear. On the other hand, we witnessed how a couple of Pygmy men were punished in the centre of the village by being forced to kneel down and by being slapped . The accusation was stealing from a plantation. The mutual dependence is difficult to judge. As one assistant remarked: "if my Pygmy asks for something, even the trousers I am wearing, I have to give it." But he added that this did not happen. It seems to be a situation of subtle equilibrium. The Biaka like smoking, even young children often smoke, but they are dependent on the villagers for cigarettes and work for them. One extremely important thing they have to get from others has not been mentioned yet: metal. The Biaka never learned to work iron. They are provided with spearpoints, knives and machetes by the villagers. Also for the cooking pots, now often made of aluminium, but of earthen in the past, they depend on the villagers.

There is a mutual dependence of the Biaka and the Bangandu, the ones needing the others. It could be that the taxes have caused the villagers to be more in need of money. This money can be received partly from selling a cashcrop and meat. For both, the Biaka are a very welcome aid. The Biaka, however, also have their demands and wishes. Salt is appreciated highly for the preparation of the meals but they therefore need the relation and exchange with "their" villager, the "owner".

The large ecological and cultural difference expected, before starting this study, between Biaka and Bangandu appeared not to exist. The Biaka were known to be hunters and there were many previous studies on them. The Bangandu had received very little scientific interest at that time. The hunters appeared to have adapted to the life of the villagers to a certain extent. More important, however, was the finding that the Bangandu had far more relations with not only the forest people but also with the forest itself than we had realized when discussing the probabilities of a comparative study including Pygmy hunters gatherers.

Some more remarks should be made on the psychological interdependence of both the groups. Some of the Biaka and especially the men like wearing western clothing. These are often not much more than rags but sometimes in still

good condition. The clothing is not appropriate for their way of life. Often we noticed that a shirt was put on when we visited a camp or that someone put some clothes on before going to the village

Further it seems that the Biaka need no help from the Bangandu healers and they seem not to be afraid of witchcraft used by the villagers to their disadvantage. The Bangandu, however, do receive help from the Biaka healers during their ceremonial eboko dance. We saw a man being treated. He inhaled the smoke from the singeing callosity of the healer's foot which had been drawn slowly over a red hot machete taken from the fire. The man, who had fallen from a palm tree several days before, paid discretely with a coin of one hundred francs. This amount was the equivalent of two packets of cigarettes, a substantial bunch of bananas or a stiff drink in the village. By the way, in Bagandu no money was given for work.

The Biaka are known to be able to cause a hernia by witchcraft and most Bangandu seem to really fear this. We were once called to see a woman who had fallen ill suddenly. She yelled very loudly, with intervals of about thirty seconds and kept it up for hours. It became clear that in a quarrel she had slapped a Biaka man in his own camp. She came home after this event, did not eat, drink or sleep until the next morning when she really broke down. Western medicine calmed her down a bit, but the Bangandu healer, who hospitalized her in a hut on his compound for some weeks, cured her illness. The Biaka and Bangandu usually interact freely, without giving the impression, at least to us western observers, of subordination of the one to the other. Some Bangandu show themselves rather authoritarian in the approach of "their" Pygmies. Others, however, are very kind, quiet and sometimes genuinely friendly. Villagers often witness the dances in the camps and the Biaka can often be found chatting with the villagers in or near their huts. Yet both groups live in their own way, be it hunting and gathering or sowing and harvesting on the border between savannah and woods or in the enormous forest which still has food for many.

CHAPTER 3: THE SAMPLING PROCEDURE

During the first period in the field in the first half of 1975, in which an important object was to become familiar with the people in the villages and camps, their culture, habits, customs, way of life, and language, the main problem for sampling seemed to be that of determining the ages of the Biaka children. Determination of their ages had never been done before. One approach was tried by Cavalli Sforza (1971) who compared the birth order of the Biaka of a certain camp with the birth order of some neighbouring Bangandu farmers of an age approximately known, and thus establishing age groups. This technique seemed to some extent satisfactory to us as it seemed possible to match a group of Bangandu children from the villages with a group of Biaka. It was decided that the approach via the villagers would in any case be more fruitful.

In the small village of Popoto on the border of the Ngandu region, we had already found that one could sometimes establish that a certain Biaka child was born in the same year and same month as a Bangandu child. The age of the Bangandu child could be found in its birth certificate, usually given to the parents. This does not mean, however, that this birth certificate could always be produced by the parents on demand. Some documents had been lost, some were duplicates of lost ones and of doubtful reliability and some had clearly been filled in a long time after the child's birth and gave only a rough estimate of the year of birth. One should not forget that age in the western sense of the number of years, months and days between the moment of birth and the present is an absolute irrelevant thing in most African cultures. Physical and psychological maturation, firmness and skill is what counts. For most adults, age was only indicated on their documents by "roughly" and then the year. We then decided to visit a number of families in the villages of Lombo, Boumbekiti and Bozambo of whom we knew that the head of the family was also an "owner of Pygmies". We contacted the head of the family and made an appointment, explained our work and made up a census of the family, stressing his offspring, children and grandchildren. For these children and grandchildren we tried to reconstruct year and month of birth. Besides using the certificates mentioned, we became more and more able to relate the births of children to important events in the village. The field-assistant Mr. Lamine proved to be remarkably inventive, and to have a thorough knowledge of the recent local history. This was partly due to his political activities which had won him the position of second deputy mayor of the community.

After we had finished the census of the family we turned to the Biaka "belonging to" this owner. For every child of the "owner", we asked him whether he knew if a particular Biaka child had been born in the same season as this particular child. This occasionally happened to be the case and then it was a matter of finding out the number of months between the two births. It is important to know, as regards the month of birth, that there is a stable pattern of agricultural activities such as the felling of trees for the maize and manioc fields, the cutting of the bushes and the burning of the field, the preparation of palm oil before the time the villagers leave for the caterpillar camps in the woods and other seasonal activities. In the region of the rain forest the economic activities show a regular pattern, providing a fairly reliable local time system. Working in this way we found rather precise information about the children of the village in the age range needed: nine, ten and eleven years old. For the Biaka the method also proved to be useful. Quite often we would come across some young people whom we then traced and found in our files. This depended, however, on them being near the village or in the forest. Tracking them in the forest would mean several days of walking. Testing them at that particular moment in their camp was out of the question but they would probably come near the village later on. See Graph 3.1 for a map of the Lobaye region.

When checking the findings with the Biaka themselves we found that several of the crucial incidents discussed with the Bangandu villagers were known by the adults in some of the Biaka camps. The death of a well-known village chief, for example, was recalled in several camps of Biaka who had relations with owners in this village. This fact was a reliability check for us and as such of enormous importance. There was one crucial and, for us, fortunate coincidence. In the period in which the children that acted as subjects were born a leopard had terrorized the region. The Biaka feared the man-eater to such an extent that many left their camps and slept in the huts of the villagers at night. The animal was killed, however, and this event appeared to be a landmark in recent history.

After visiting many of the camps which were in the neighbourhood of the villages we started making up, in this first year, a list of Biaka children. These children would be in the appropriate age range for testing during the third field period. A difficulty was that we could not know if they would actually be in the Bangandu area during that time. Indeed it turned out that during the third field period we had to find some more children, which we did in the way described before.

The results of an internal census of two Bangandu villages by one of the teammembers of the Central African Differentiation Project gave a rough idea of the number of inhabitants to be expected in these and other villages and,

especially, of the number of children who could be in the appropriate age range of nine to twelve years for testing during the scheduled testing period. A sample of these children and their parents would constitute the "family sample" for the Bangandu. Besides this sample another group of adult subjects would be added: adults, females and males for both Biaka and Bangandu. They were in the age range of approximately eighteen to fifty-five years. The reason for this choice is the finding that, at least in western countries, the field-dependence of people is rather stable in this age range. In the second field period a list of potential subjects was drawn up consisting of all the children whose births had been registered by the administration of the community. Added to this latter list were some children who were known by our assistants but who appeared not to have been registered. The total number of children thus available appeared to be somewhat smaller than we had expected initially but large enough for sampling purposes. As we expected on the basis of our pilotwork that the testing of children would be the most difficult part of our study, we postponed testing the families until the third field period from December 1976 to July 1977, when the children would have become familiar with our presence in the village.

Afterwards when the ages of the children in these four important groups of subjects were compared statistically, we did not only find that the distribution within each of the four groups could be considered to be normal (Kolmogorov-Smirnov) but also that the groups were not statistically different as to age (t-test, two tailed). The mean ages are for the Biaka boys 126.4 months (s.d. 7.8), for the Biaka girls 125.2 months (s.d. 9.5), for the Bangandu boys 126.3 (s.d. 10.0) and for the Bangandu girls 126.5 months (s.d. 7.1). It has already been mentioned that we selected children of nine to twelve years of age. The reason is that at this age field dependence independence is established in a stable way (Witkin & Goodenough, 1981), at least in Western settings. Testing younger children would have resulted in many complications.

In the second field period, during the first half of 1976, attention was focussed mainly on a larger group of adult Biaka and Bangandu, not being parents of children in our sample. The Bangandu males were both schooled and unschooled. This group of adults mostly called the "community sample" participated also in other studies in the Central African Differentiation Project, (Annis 1980).

Our initial plan was to take a random sample of adult men in the sense that we would adopt a certain proportion of the men living in a particular village and contact them. When we tried this in the northern part of Lombo for which we had the most elaborate census, it appeared to be very difficult. The availability was influenced by the occupa-

tional activities. Making an appointment and keeping it was not easy. The men also travelled rather a lot and very often had familial obligations like mourning ceremonies, which made it impossible to keep the appointment. A rainy morning made it possible for several people to come for testing immediately as working on the plantation was impossible. On the other hand some days would pass, on which several appointments had to be cancelled for various reasons. As this was considered to be too time-consuming another procedure was adopted for this part of the sample. This consisted of inviting people who seemed to be available at the moment we needed subjects and then to really make sure that they would indeed come to be tested. The way it was done most of the time was to select a house at random; ascertain from our assistant who lived there, then choose any of the occupants' names and make an appointment for the same day or, if this was impossible, for the next day. If this was not feasible a note was made and further appointments were attempted on later occasions until the person in question had been tested.

For the Biaka the same procedure was used. It should be noted that we met with hardly any refusals to participate. One Bangandu father (who later on scored extremely high on tests of field-independence) showed much resistance but was finally persuaded to come. One Biaka woman did not want to be tested. She lived near the somewhat remote village of Bokoma, however, and it seemed to us that she was afraid of coming with us in the car as the other subjects from her camp did. Coming alone on foot was a possibility but it would certainly have caused hilarity among the other people of the camp. One Biaka family, mother, father and daughter, living in a rather remote camp, was extremely friendly to the research worker, but they never came to be tested. The assistants told us that it was impossible to convince them that a white man would come and not take blood samples during the testing.

There was not any record of people who had been to school and the information provided by the assistants prior to testing appeared not to be fully reliable. The adult men were questioned during the testing to verify if they had had any schooling. Those with schooling were put in the "schooled" group and those without any at all in the "non schooled" group. None of the women tested had ever gone to school. It would probably have been possible to find a small group of (mainly young) schooled Bangandu women, but this was not done because of the amount of time it would have taken. The group of unschooled women in both the Biaka and Bangandu groups remained at the low number of people tested in the second field period. The reason was the rather large group of adult men needed to ensure enough overlap with the samples for other studies in the same project (Van de Koppel, 1977). For the educated Bangandu boys the procedure was simple. The headmaster of the

school made up a list of pupils with their names and birthdays. As this was mainly copied from the local baptismal register, which was also available at the mission, there was little doubt as to the reliability. We took at random a number of pupils from this list who were in the appropriate age range. Testing was done during school-hours.

We would like to stress that we never approached people for testing purposes by means of the medical assistance we provided. People who came to receive help or whom we visited at their own request when someone was ill and not capable of coming himself, were not urged to participate in the study. Neither was any attempt made to recruit relatives present at those moments. It goes without saying that the fact that we did what we could, made refusals to help us with our work less likely.

One point is of particular importance. During our first period in the field it seemed rather easy to draw a sufficiently large and representative sample of unschooled children. If we had known that the stress on schooling by the government and especially in this community was very great at that moment we would not have delayed testing until the third field period. Now we found that many of the children had started school in early September whereas we started in December during our last field period. As it is generally known that even a short period of formal schooling has considerable impact upon the results of cognitive tasks (e.g. Greenfield, 1966) we decided not to keep these children in the uneducated subgroup. This sharpened the problem, however, that the decision to send the children to school could have been a variable which intervened with the main variables of our study. The only thing we could do was to check carefully whether there was any difference between families who sent the children to school and those who did not. The first possibility checked was the socio-economic situation. No obvious reasons could be found. Nor could our assistants or the parents provide any explanation of why some parents sent their children to school and others did not. It seemed to us that the newly elected mayor, the first muslim convert in the village, insisted on schooling. Especially those living in his neighbourhood could not easily refuse openly.

In our first field period the percentage of children going to school at least for one year was estimated by the Mbaiki mission to be 50 %. In the third period it was estimated by us to be around 80%.

Bossembele, the place where we did the Gbanu part of the research, is a rather small town some 180 kilometers from the capital Bangui. It is a "sous-perfecture" and as a result serves as a small administrative centre. We did our work in the Catholic Mission which was situated out of town near the road which connects the capital with Cameroun. The surroundings of the mission are more reminiscent of a village than of a suburb. The Gbanu are mainly farmers and

besides their own living they try to cultivate some manoic to be traded as a cash crop in Bossembele, or sold to merchants from Bangui. Some also have a small coffee plantation.

Next to the mission there was a school. Here we recruited the educated boys. The director of the school gave us his list of pupils with their names and birthdays. As these were mainly copied from the baptismal register which was available at the mission there was little doubt regarding the reliability. We matched it with our Bangandu sample in so far that there is a Gbanu child for every Bangandu child in the sample, and that each child is the same number of years old and is attending the same class at school. As there was also a school in the town, these pupils all lived in the same suburban area where the mission was situated or in the villages west of Bossembele, which are scattered along the road or more inland.

We soon found that most of the boys from this area went to school but that for the girls it was still more or less an exception. Therefore we decided to adopt only a small group of non-school-going girls in the same age range as our Bangandu sample. Further we decided to form two subgroups of men, one educated and one non-educated, to parallel the Bangandu samples.

As we were known to be guests of the mission, refusals to cooperate were rather unlikely. We visited the houses in the villages, made an informal census and invited the people who belonged to one of the sample groups mentioned to cooperate. On the day scheduled for testing, the people we had an appointment with were picked up by car and brought to the mission. After testing they were taken home. The furthest distance we had to go to find people was sixteen kilometers. The reward for the subjects was principally the same as in Bangandu (see chapter 5) but as we realized that we did not make any real investment in the villages in terms of goods, employment or services, we augmented the rewards considerably. There were no refusals.

In table 3.1 an overview is given of the various samples and the number of people in each sample. It should be stressed that these numbers represent the maximum number of persons for which we have at least some data.

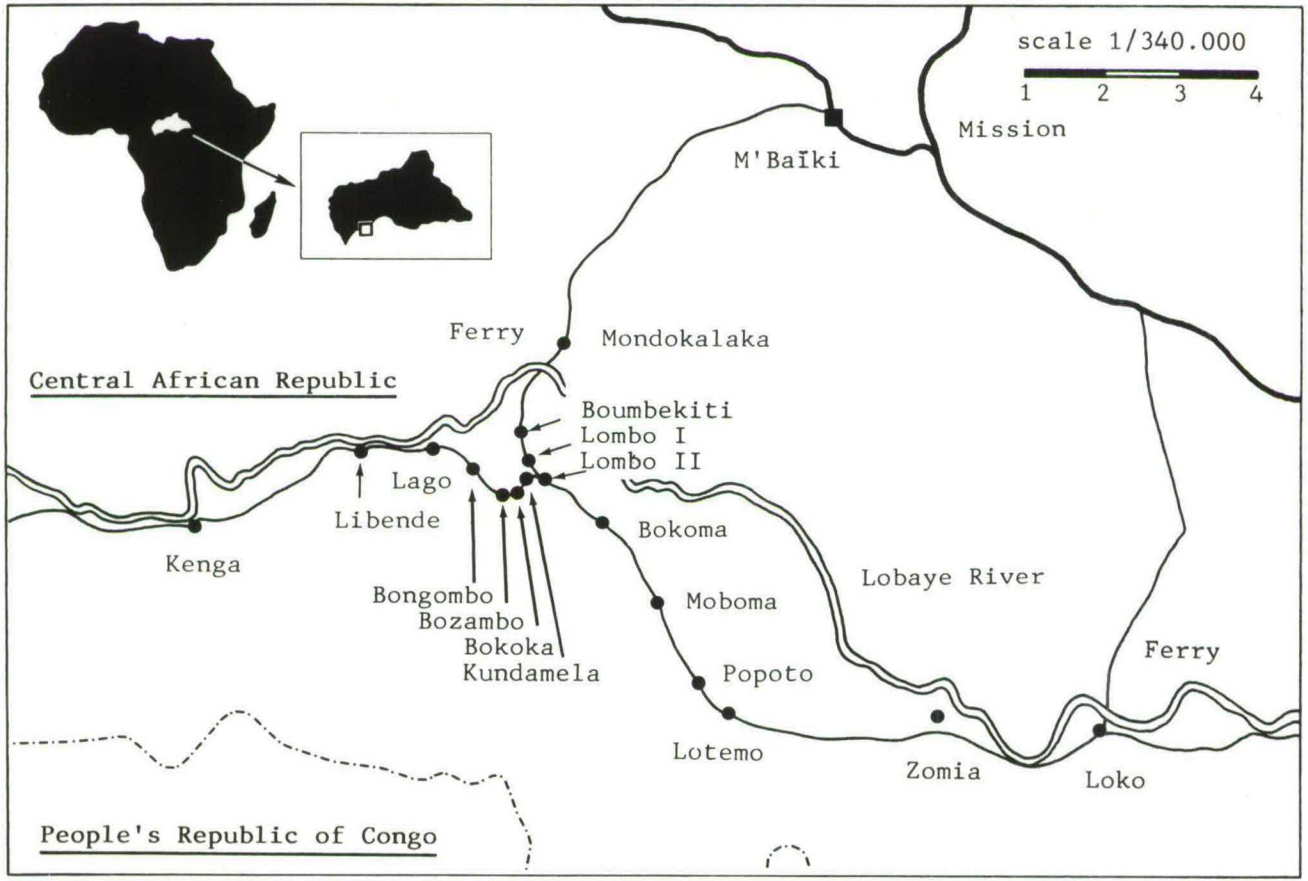
In 1976 the total number of inhabitants of the villages was estimated about 1.800. This was based on the results of the informal census of two villages compared with the number of 2.620 reported in the official census of the community. It appeared, however, that the latter one also included people who went to other villages to marry and settle down and even their offspring. The number of boys and girls seemed to be about equal while the women outnumbered the men with about 25%. This fact could point to a certain degree of migration to the capital.

Despite our efforts to obtain the random samples

needed for statistical testing, we did not succeed completely in this respect. As a consequence the tests of significance have to be seen generally as a criterion for the relevance of the various findings.

Table 3.1 Sample Classification and Number of Participants

Cultural group	Sex	Age	Unschooled	Schooled
Biaka	male	adult	67	-
	male	child	21	-
	female	adult	33	-
	female	child	19	-
Bangandu	male	adult	58	21
	male	child	13	26
	female	adult	37	-
	female	child	19	-
Gbanu	male	adult	24	16
	male	child	-	22
	female	child	13	-



Graph 3.1. Map of the Lobaye Region where the study was conducted.

CHAPTER 4: THE DEVELOPMENT OF PROCEDURES FOR ASSESSING COGNITIVE STYLE

4.1 The Tests

In the first part of this chapter we will describe the techniques adopted to test the general hypothesis that the Biaka Pygmies are more field independent than the Bangandu. As far as we know only one attempt had ever been made at testing Pygmies. This first attempt was made by Bonte (1960) who found it impossible to present the Muller-Lyer illusion in its usual form to Mbuti Pygmies. Only after she had constructed a wooden figure was she able to carry out the testing.

We took to the field the materials as they are used in western settings but also some versions adapted elsewhere (e.g. Ord, 1968, McElwain & Kearney, 1970, Reuning & Wortley, 1973). Further equipment enabled us to construct materials in the field.

We decided not to focus only on one or two of the measurements of field independence, as has been done in so many studies, the researcher often using either the Rod and Frame Test or the Embedded Figures Test. Rather, we used four or five measurements. We feared that using some tests would raise problems as regards understanding the task and that they would probably even have to be dropped. We had been warned against this by Reuning and Wortley's (1973) experience. When they presented a version of the Embedded Figures Test to Bushmen subjects the scores they obtained were so low that it seemed doubtful whether the task had actually been understood. Baran (1970) too, cautioned against attempts to use the Embedded Figures Test with illiterates, attempts having failed. The existing tests which we intended to present, in one form or another, were:

The Body Adjustment Test. This is an apparatus for evaluating the subject's perception of the position of his body and of the surroundings in relation to the upright. The apparatus is in fact a box of six by six feet that can be tilted to the right or to the left. Independently, a chair inside the room can be tilted. As in the former task the subject has to resist the influence of the field and adjust himself to the vertical position. The smaller the deviation between his position and the vertical, the more he proves himself to be field independent (Witkin et al., 1962, 1974).

The Embedded Figures Test. In this test the subject is shown several complex figures on cards. On each card a simple form is 'embedded' within the predominant complex pattern. The simple form is also shown independently. The two forms are not shown simultaneously but the simple form can be looked at again on request. The mean time taken by

a subject to find the simple forms constitutes his score. The higher the score, the more field dependent the subject is (Witkin, 1969b). A special form of this test designed for the use with children is the Children's Embedded Figures Test (Witkin, ibid.).

The Kohs Block Design Test. The subject is asked to copy a design shown on a card. He has to make this copy using coloured one-inch cubes made of wood. This test and several versions of it are used as measures of field independence. The original test dates from 1923 (Kohs, 1923), long before the research on psychological differentiation started and was used in Kohs's approach to intelligence measurement. The versions of it used in the various Wechsler Tests have become very well known.

The Articulation of Body Concept Scale. The subject is asked to draw a person. When he has done so he is asked to draw another person of the opposite sex. The subject's body concept is evaluated on a 5-point scale, a low score indicating a less differentiated body concept (Witkin et al., 1962,1974).

On the following pages we shall try to give an account of how the procedures for these tests were developed. This was partly done before entering the field, partly during the long pilot period in the field and finally, to a certain extent, by a careful analysis of the results of the pilot study, taking into consideration the many observations made during the test sessions in Africa.

The Portable Rod and Frame Test. This test has already served many times as an equivalent to the Rod and Frame Test which, in its original form, is not very suitable for fieldwork. The apparatus was developed by Oltman (1968) and consists of a black rod and a black frame in a plexiglass container. Dim light being filtered through the plexiglass creates an almost cueless interior. The subject places his head in the apparatus. A curved shield around the entrance prevents him from seeing anything outside the 'room'. His chin rests on a knob covered with soft plastic, his hands are in his lap while he sits in a chair with his feet resting on the ground or, in the case of children, hanging. Numerous studies (e.g. Oltman, 1968) have demonstrated the equivalence of the P.R.F.T. and R.F.T. There are several slightly different versions. We used the metal and plexiglass one made by the Polymetric Company (Model V-1260-AR), as this version could be taken apart and put together in the field. It has a knob with which the subject can move the rod himself. We did not use this specific device and dismantled that part of the apparatus so that it worked in just the same way as the regular R.F.T. and P.R.F.T. described in so many previous studies. The research worker sat behind the P.R.F.T. apparatus, moved the frame and rod and wrote down the results. The assistant sat beside the subject, gave the instructions and adjusted the small curtain, which was placed in front of

the subject's face, prior to testing, every time the research worker moved the frame. This way of presenting provided the subject, who saw virtually nothing of what was going on around him, with a familiar person close to him. We derived this method of working from Welles's (1971) work. During the actual testing the research worker made only a few remarks in a low voice in Dingandu like "ready?", "close the curtain" and "is it upright". (This was in fact not necessary but we preferred it to remaining silent all the time.) Before testing the height of the chair was adjusted for the children and some of the smaller adult Biaka by putting planks under the chair and adjusting the headrest.

We had expected to have serious problems in explaining the task to the Biaka, especially after some previous weeks of experiences with other tests, such as the Kohs Blocks. Testing with the P.R.F.T., however, proceeded smoothly and only twice did the subject fail to understand the task on the first trial. The testing was interrupted in these cases as the subject remained silent, sitting with his head in the apparatus. In these two cases testing with the P.R.F.T. was repeated without problems later on during the test session.

What particularly surprised us were the remarkably low deviations from the vertical we recorded from the very first moment we started testing. Our 'champion' was a ten year old Biaka boy, called Mindo, who had a total deviation from the mean of 5.5 degrees on eight trials. We never looked at the needle and scale as we slowly rotated the heavy metal disc with the frame. The moment we heard the little boy say "naboteme", (upright), inside the box we stopped and asked him as usual to confirm it, "is it upright?", then we looked and found, on some trials, that the deviation was virtually zero!

For the testing procedure we followed the instructions given by Oltman (1968) but gave the assistant the freedom to use his own words. One extra device had been made and was used. The assistant, when explaining the task, showed the subject a small apparatus consisting of a plywood disc painted white, with a black plastic frame glued on it. In the centre of the frame was a black plastic rod which could be rotated with the aid of a knob on the back of the frame. This was demonstrated, as we found during pilot testing that explaining to the subjects everything that they would see, demanded too much of their concentration. They became restless during the explanation and visibly ill at ease. Now it was simply shown what the interior of the apparatus looked like. Naturally, the assistant did not speak of the "walls of this room" as Oltman's instructions indicate, but referred to the way in which a palm tree grows: "straight upwards!" We had prepared ourselves for Gerard's (1969) version of the P.R.F.T. with a 'man in a frame'. We had made a plastic model of a man, as he did, and also of a

palm tree to be glued into the P.R.F.T., but it was not necessary to have recourse to this. During the testing no more aid or instructions were given. We presented ten test trials, the eight trials indicated by Oltman and then the first two items once again as number nine and ten in the series. This was done because Dreyer, Dreyer and Nebelkopf (1971) found that some kindergarten children only understood the task fully after performing the first two trials. In retrospect, however, we could well have dispensed with this procedure. The subjects seemed to understand the task from the beginning and did not show the large deviations on the first and second trials which would have indicated a lack of understanding. However, if this had been the case, we would have considered replacing trials one and two by trials nine and ten and would not have chosen to take as a final score on this test the total deviation over the ten trials as Dreyer et al. (ibid.) did. Diminishing the effect of two extreme scores on the first items, by adding eight instead of six representative scores has hardly any beneficial effect!

We avoided any direct sunshine on the P.R.F.T. apparatus but could not avoid changes in the intensity of the light inside the apparatus from subject to subject, as the light altered according to the degree of cloud and the time of the day. As Long (1973) had found that a low light intensity resulted in a higher deviation on the P.R.F.T., we measured the light intensity by holding a light meter in the opening of the P.R.F.T. apparatus just before starting the test procedure. For the total group of people tested in Bangandu (N = 225) we found virtually no correlation between the intensity of light and the total deviation ($r = -.03$).

The Body Adjustment Test. The apparatus was built on the site where we had our field laboratory. Only the metal parts, needed to make an axle under the chair, were made at Tilburg University and were taken to the field. The local carpenter of Bangandu constructed the chair which was provided with armrests, a footrest and an adjustable headrest according to the instructions given by R.C. Annis (Annis, 1980). The subjects sat on this chair inside a large box of 180 by 180 cm. This box was made of large pieces of plywood. (The plywood was generously provided by the S.C.A.D. plywood factory which was situated in the Lobay region.) The effect was that the subject sitting on the chair saw only the four "walls" of the otherwise almost cueless interior of the small "room". All chinks were covered on the outside with black plastic tape to prevent light from coming in. (It proved to be both simple and effective.) The headrest prevented the subject from looking outside. The fact that the chair was placed inside the box forced us to make an opening in the bottom. We covered the subject's knees and part of the floor of the box with a large sheet of cotton. Between the trials a small curtain

was put in front of the subject's face. As a result he saw only the interior of the box in its tilted position, being tilted himself either to the same side or to the opposite side of the box. The task was explained by the assistant, using his own words. He followed the written instructions we gave him. These instructions were discussed with him. He did not speak about "left" and "right", but of Boumbekiti, a village, and Congo, an expression in use for the vast rain forest south of the village. The same assistant together with the research worker moved the chair with the subject, with the aid of a large handle at the back of the chair. Two other assistants stood at both sides of the box, which was not pivoted but in fact rested on a heavy pole slotted between two beams at the bottom of the box. They tilted the box as instructed. Only the research worker was able to read the deviations shown on a protractor mounted on the chair. He read the deviations when the subject had indicated that he was sitting upright and had confirmed that he was "really upright now", and dictated the results. He and the assistant both held on to the handle throughout the test session to ensure that no subject could fall off the chair. As the assistants had convinced us that trying to test women and girls with the B.A.T. would lead to many refusals we decided to test boys and men only. On several occasions a subject was not tested with the B.A.T., because one or more of the five people needed for its use were not available. The reactions of the subjects on the B.A.T. procedure were no different from what we would have expected from western students. They accepted it as a matter of fact and showed some curiosity. It was sometimes evident that boys, and especially Biaka boys, were somewhat frightened by the big "machine". This fear disappeared, however, once they had watched, at some distance, while their fathers were being tested. We did not allow other subjects to look inside the box while someone was tested. Those waiting to be tested were asked to sit down on a bench beside or behind the B.A.T. apparatus. Every subject was given four instruction items and eight test trials. (See Table 4.1.) During the instruction trials it had to be made clear to the subject that room and chair were tilted and that he had to indicate in which direction both were tilted. During the instruction trials, errors occurred quite often, but they were also often corrected spontaneously. During the test trials we never experienced any misunderstandings about the task to be performed.

The "African Embedded Figures Test". When presenting the Embedded Figures Test we found that it was difficult to make clear to the subject what he was expected to do. The Biaka, in particular, were very hesitant and ill at ease, or kept saying that it was too difficult. We had already realized that when pointing a finger at the hidden figure, the subject would cover a rather large part of the small

picture, and that this could make the task difficult especially for someone who has virtually no experience with images, writing, printing etc. Tracing the small figure, once it had been found with a pencil or small stick, would probably create more problems rather than solve them. We had already decided that when using either form of the Embedded Figures Test we would ask all the subjects either to point at or to trace the small figure.

Table 4.1 Inclinations of chair and room of the Body Adjustment Test

Instruction items	1. chair 22	left	room 35	left
	2. chair 22	right	room 35	left
	3. chair 22	right	room 35	right
	4. chair 22	left	room 35	right
Test items	1. chair 22	right	room 35	right
	2. chair 22	left	room 35	right
	3. chair 22	right	room 35	left
	4. chair 22	left	room 35	left
	5. chair 22	left	room 35	right
	6. chair 22	right	room 35	right
	7. chair 22	left	room 35	left
	8. chair 22	right	room 35	left

Previous experience with schoolchildren in Holland had taught us that using the tracing approach for the Children's Embedded Figures Test considerably changed the order of item-difficulties when compared with the order given in the manual (Van de Koppel, 1974). The item-difficulties in the manual are based upon the pointing technique using a rubber stamp and ink to indicate the simple figure.

We had made a version of the E.F.T. with enlarged photographs (13 x 18 cm) of the original E.F.T. It was an improvement in the sense that it now became easier to see how the subject was tracing the simple figure but it did not solve the problem of subjects complaining about the difficulty. The version used by Reuning and Wortley (1973) was also tried out. We found that it was equally difficult. It did, however, provide a significant clue. Like the E.F.T., this test has several different simple figures, but there are without colour so that the complex figures are not patterns of differently coloured geometric forms but patterns of lines. Careful observation of the subjects gave us the impression that they quite often perceived the simple figure. They started to trace it, beginning correctly with one of the lines of the simple figure but when they arrived at an intersection they got lost. We realized that the memory for geometric forms, which was undoubtedly an unwanted variable in this study, could play too large a

role. This was certainly not the only reason why the test was too difficult but probably a crucial one. Added to the unfamiliarity with geometrical forms and the lack of motivation for what is, in fact, a rather tedious task, it could have been sufficient for the subjects to give up.

Before going in the field we had already drawn some pictures of what we thought to be scenes that would be familiar to the subjects: an axe and spears, trees, a small group of the huts etc. The sources were Turnbull's drawings in his report on the Mbuti Pygmies (1965b), Klein's version of the E.F.T. used in Guatemala (Klein, Freeman & Kagan, 1972) and our own memories of a former two year period in Africa of "what Africa looks like". Presenting hidden figures in this way appeared to work. The subjects suddenly became much more interested, readily named the images and pointed to the hidden triangle. We then started to draw more pictures, continuing to use the same hidden figure, a triangle, which we called "arrowpoint".

We first used several triangles of different colours to explain that the colour was of no importance and to look at the form but soon we found that it was only important to teach the subject to remember the form. We did not consider to always keep the simple figure in front of the subject as this would have meant a very different task. It remained difficult, however, to prevent subjects from what could best be called "forgetting" the triangle and proceeding to what seemed to be random pointing at elements in the drawings. We then decided to precede the actual test with a training series. We designed ten pictures of a gradually increasing grade of difficulty. The first was just a drawing of two triangles of different sizes; the last one showed a complicated picture with the triangle in an embedding context. We went through this series carefully and slowly, teaching subjects to keep the arrowpoint in mind. The demonstration form was an iron triangle constructed for this purpose by the blacksmith of Bagandu. At this point we had gained enough confidence in the method and stopped pilot testing with this test to proceed to another one.

We decided to do another pilot study after our return to Holland in the second half of 1975. In the autumn of that year a professional artist redrew many of the twenty nine drawings of the test and all of the introduction items. Results of this pilot study which we continued in the second half of 1976 were encouraging as to reliability and validity of this new test (Van de Koppel & Roozeveld van der Ven, 1976). We tested one hundred children aged six to eleven (mean age 88.1 months, s.d. 11.4) with both the Children's Embedded Figures Test and the "African Embedded Figures Test" (as we called it). The correlation between the tests was $r = .64$. When age was partialled out the correlation was $r = .59$. As to the reliability we

found the internal consistency to be alpha = .84. In its final form the test has twenty-three items. One item was dropped as it correlated negatively with the total test result. Our impression was that this was caused by the fact that some subjects who performed low on the test in general, pointed at random in the middle of the drawing. And this was the place where the triangle was hidden! Of the twenty-nine items originally designed, the first five items were used to make the subject familiar with the test itself after the training. For the geometric forms of the training series the right solution was given after a failure and the triangle was superimposed on the small figure which had to be found. There appeared to be very few failures in this first group of easy items for our African subjects.

In a later study (Bervoets & Nuyten, 1979) the test in its final form was presented to twenty-four Kindergarten children (mean age 63.9 months; s.d. 7.1). The results were comparable to those of the study mentioned previously. A correlation of r = .64 was found with the Preschool Embedded Figures Test (Coates, 1972). The correlation with the Goodenough-Harris Draw-a-man-scale (Harris & Goodenough 1963) was r = .58. With the Block Design subtest of the W.I.P.S.I. (Wechsler, 1963, 1967) the correlation was only r = .23. The items of the test are represented in Figure 4.

The Block Design Training Task. In the studies most closely related to our study (Berry, 1976) the original Kohs Blocks are used to assess the analysis and restructuring of complex visual designs. We tried this test out and found it too complicated for our subjects, especially the Biaka. It often seemed as if the task had not been understood at all and even the very first item usually remained unsolved. We had the impression that the great difference in scale between drawings and blocks was an obstacle. Enlarging the scale of the drawings did not solve the problem, however. We then decided to try another test which was especially constructed for use with illiterates and which has little flat squares in stead of cubes: the Pattern Matching Subtest from the Queensland Test (McElwain & Kearney, 1970). As indicated by the authors, the test is "designed for use under conditions of reduced communication". It is a somewhat revised version of the formerly developed Pacific Design Construction Test by Ord (Ord, 1968). In the test the pattern is constructed in a frame. This makes the test clearer as the subject now has a well-defined space in which to copy the pattern. Patterns consisting of four, nine or sixteen squares are formed. It was Feuerstein's work (Feuerstein, 1972a, 1972b) which gave us an idea of how to work with this test. When the task has been made as clear to the subject as possible and when one is unable to make the test any easier to cope with, without in fact affecting the content of the task, (in this case the analysis and reconstruction of a

pattern) one has to change the whole approach. Instead of using spontaneous responses, Feuerstein (ibid.) employs a test-learning-test-situation.

As we only had a limited amount of time available for each subject, due to the fact that we always had to try to do all the testing of one Biaka subject in one morning, a real training along Feuerstein's lines was out of the question. What we tried to do was to assess how quickly a subject learnt the task. The task itself had of course to be the one mentioned above. We say this explicitly as it became apparent during the pilot testing just how quickly the nature of a task can change, with probably the most undesirable effects on test equivalence. Therefore we did not adopt the procedure tried out initially in which the subject, after each failure to construct a pattern, watched the research worker construct it. We realized that in this way we taught the subject a sequence of actions: putting together one square after the other until the design was completed.

Instead of this we first showed the subject the squares and explained that some were red, some were white and some were red and white. We then asked the subject to help us sort them and put the same ones together. We next showed a design of four squares which was put in front of the subject and said that we were going to make the same design. This one was made slowly, the subject being asked to watch carefully. We finally explained again that the one we had now, was exactly the same as the one put in front of him initially. The next question was a request to make another identical pattern in the empty frame beside the two other ones. If this was done correctly we turned to the next item. If, however, an error was made we said that the result was "quite good" but not "very good". The error was corrected carefully by removing one or more squares and replacing them. In cases of rotation errors the frame was never rotated but the design was changed. If, in a following item a half white-half red square was rotated we removed the square and rotated it to the right position before putting it back. Six trials were allowed for each item, if necessary. There was a series of nine items. When presenting item number nine, the demonstration item of the Queensland Pattern Matching Subtest was used. The card representing the pattern to be copied was placed on the pattern shown to the subject and the subject was told that it was the same as the one shown in the frame. We also allowed six trials for this item, if they were needed, before turning to the subtest as it is used in the Queensland Test. Already in the field, this training series appeared to be the most suitable for analyses. The range of fifty-four trials appeared wide enough to enable us to discriminate among subjects.

During the actual test series the performances remained very low, especially those of the children. We had

the impression that the elaborate item nine with the demonstration card already had a somewhat demotivating effect on the subjects' attitude to the printed material i.e. the cards. The following items with cards showing the pattern to be copied appeared to be difficult.

The Sophistication of Body Proportioning Scale. It was our intention to try to evaluate in some way or another the way in which our subjects envisaged a human figure. It proved quite simple to ask the Bangandu, even the illiterates, to make a drawing using pencil and paper. The pilot study also taught us that it was possible to get a Biaka to make a drawing with a pencil on paper. A young woman who was asked to draw for the first time in her life, drew a hunting scene at our request (see Figure 4.2). We, however, had the impression that some subjects felt awkward and ill at ease. We then tried out a technique developed by Reuning and Wortley (1973). We took a seventy-five by seventy-five cm metal plate with slightly raised edges. On this plate we sprinkled a thin layer of dry sand. The subjects were then asked to draw a human figure in the sand with their fingers. When they had completed this drawing we asked whether it represented a male or a female. We coded the answer ourselves by tracing it in the sand together with the subject's number. When this had been done the drawing was photographed from a standard distance using a camerastand which could be placed in such a way that the camera was angled down towards the drawing. When the camera was removed the sand was gathered, sprinkled on the plate a second time and the subject was asked to make another drawing but this time of a man (or a woman, depending on what their first drawing had been).

It was clear right from the start that the usual method of analysis with either the Harris-Goodenough Scale or the Sophistication of Body Concept Scale would not be very appropriate since the drawings were rather roughly made due to the fact that sand does not lend itself to much detailing. Also the fact that many subjects drew small pictures covering only part of the available surface limited the detailing of the drawings.

Finally it should be noted that we learned to present the tests ourselves having learned to a certain degree the Dingandu language. However, we decided after the pilot period not to continue giving standard instructions which were written down. Our knowledge of the language was too limited to answer several questions. Furthermore we had the impression that it was much more natural to be assisted by someone who could speak fluently both Biaka and Dingandu. For the subjects this meant that they were being adressed in their own language by a person they all more or less knew.

Figure 4.2. Hunting scene drawn by Mandemba.

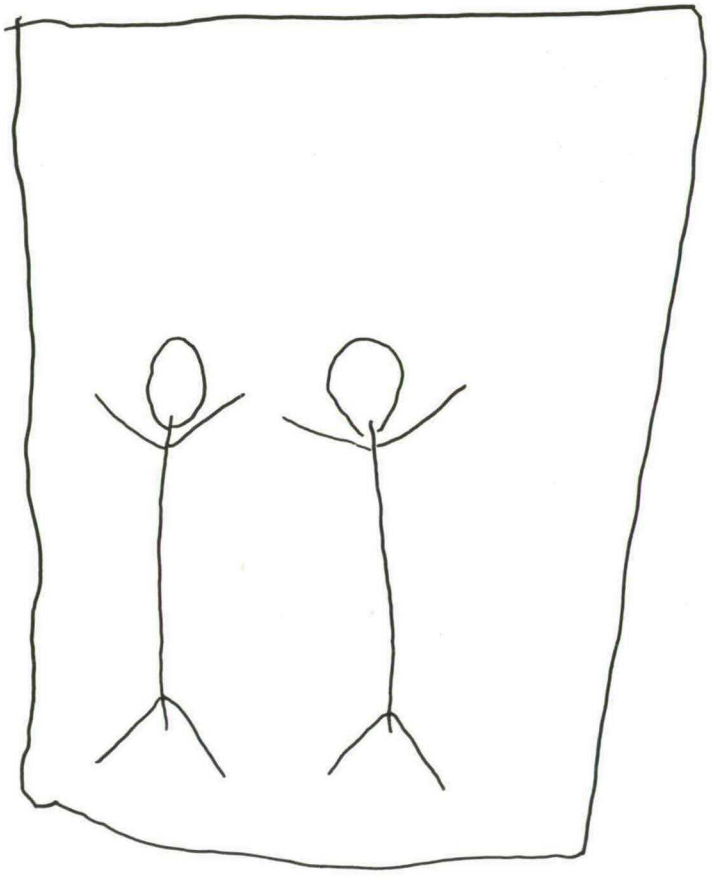


Figure 4.1. The items of the A.E.F.T.

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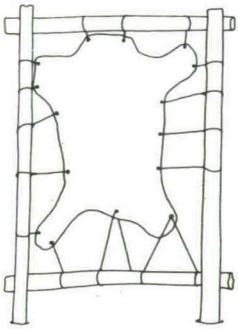

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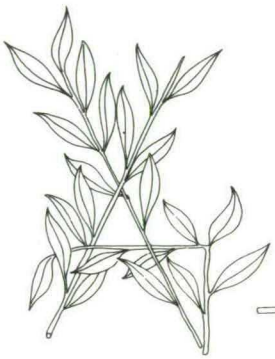

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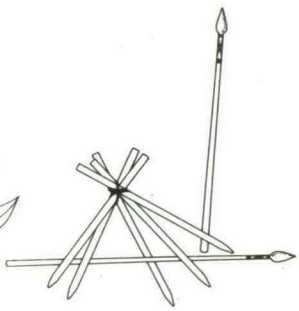

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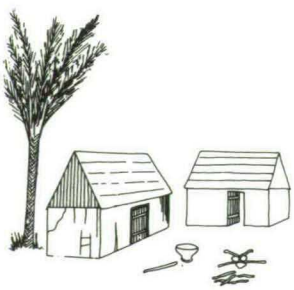

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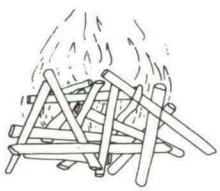

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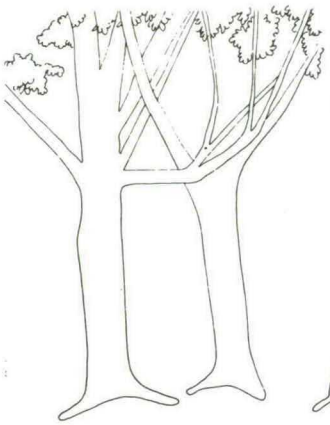

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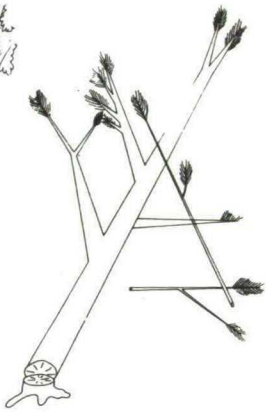

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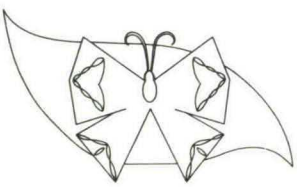

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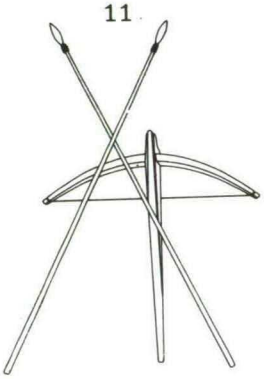

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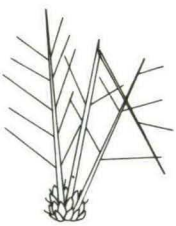

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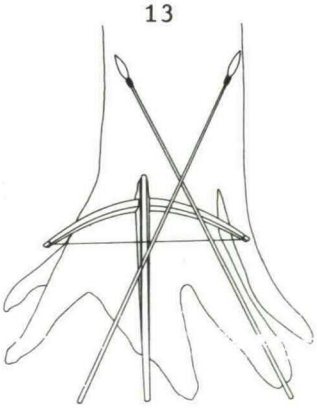

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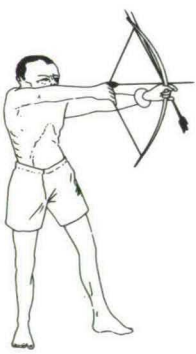

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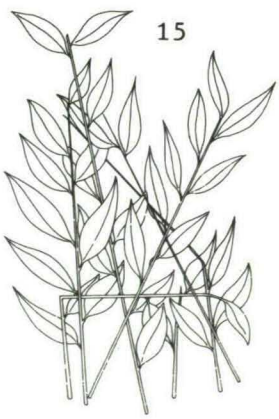

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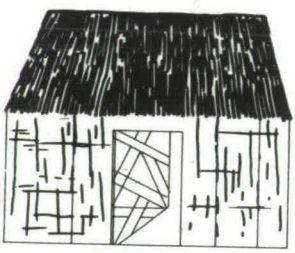

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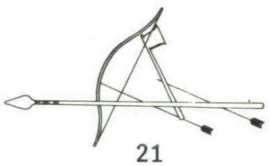

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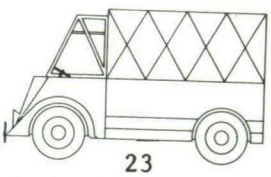

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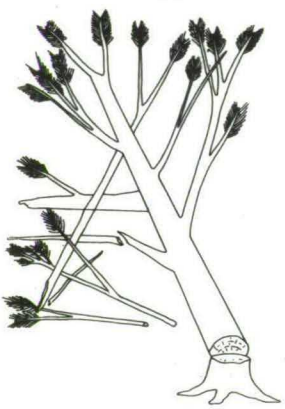

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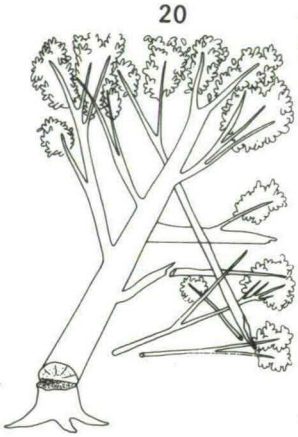

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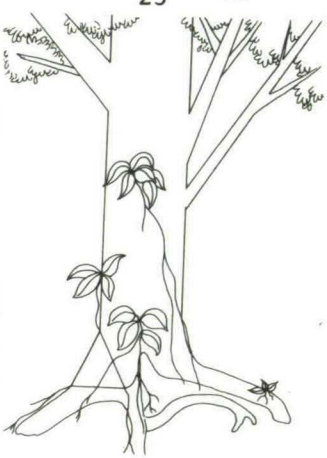

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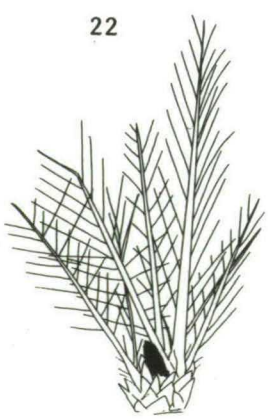

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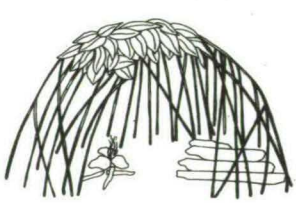

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4.2 Some Information on the Reliability of the Tests

The Portable Rod and Frame Test. The reliability of the P.R.F.T. seems to be rather high when we look to the overall coefficient of homogeneity of alpha = .78 for 375 subjects. When, however, looking at the various subsamples we see some rather low coefficients and for one group, the Bangandu girls, the coefficient is only alpha = .05 (see Table 4.1). The group has of course only seventeen subjects but when we look for the quite large groups of unschooled Biaka and Bangandu men the coefficients are not strikingly high. High coefficients are however found for some groups who show rather large deviations and the Bangandu girls have the lowest mean deviation of all subsamples. So we wonder if the very low deviations found in our study are causing some restriction of range with a negative effect on the reliability of this test in this cultural context.

The Body Adjustment Test. The reliability of the B.A.T. as estimated by the coefficient of homogeneity is not very high with an alpha = .66 for 102 subjects. When looking to the various groups to which the test was presented we see the coefficients range from .27 for the Biaka men to .71 for the group of only nine Biaka boys (see Table 4.1).

The African Embedded Figures Test. As to the reliability of the A.E.F.T. we have two estimates. Firstly we do have a test-retest reliability estimate. During the last period in the field we had the opportunity to present the test for a second time to 36 subjects from several Biaka and Bangandu subsamples who had been tested somewhere between six months and a year before. The result was an r of .84 which is fairly high given the conditions under which the testing was done. Some Biaka were found literally by chance by the assistant who kept a list of names of persons to look for when visiting the Biaka camps and invited them to the village for especially this test.

Secondly we calculated the coefficient of homogeneity, alpha. The coefficient for all 382 subjects was alpha = .75 which is rather high. We decided however to check for each subsample separately. When one realizes that some of these groups are quite small this seems a bit hazardous approach. So is the number of some of the groups of children lower than the number of items in the test. Yet as is shown in Table 4.2 the results are in general quite satisfying. Yet there are some exceptions. The test seems quite unreliable in the case of the Biaka girls. It should be noted that these children were in general the shyest of all subjects. However, during the fieldwork we never had the impression the results would be unreliable. The girls were all tested by a woman (Rietje van de Koppel) who was always assisted by the patient and friendly assistent Mr. Gnagnomat. It should also be noted that their P.R.F.T. results showed a higher coefficient of homogeneity of .50.

The same is true for the Discrimination Task (to be discussed in a later section), which has a format much like the A.E.F.T. and has a coefficient of homogeneity of alpha = .69.

Table 4.2 The coefficients of homogeneity (alpha) for the various groups of Biaka, Bangandu and Gbanu on the A.E.F.T., P.R.F.T. and B.A.T.

	A.E.F.T. alpha	N	P.R.F.T. alpha	N	B.A.T. alpha	N
Unschooled						
1. Biaka men	.80	67	.65	62	.27	24
2. Biaka women	.65	33	.73	33		
3. Biaka boys	.48	20	.83	21	.71	9
4. Biaka girls	-.07	16	.50	16		
5. Bangandu men	.69	58	.58	57	.66	42
6. Bangandu women	.79	37	.53	35		
7. Bangandu boys	.64	12	.74	12	.68	12
8. Bangandu girls	.43	17	.05	17	-	-
9. Gbanu men	.74	24	.73	24	-	-
10. Gbanu girls	.60	13	.51	13	-	-
Schooled						
11. Bangandu men	.71	21	.89	21	.54	15
12. Bangandu boys	.80	26	.82	26	-	-
13. Gbanu men	.32	16	.86	16	-	-
14. Gbanu boys	.55	22	.43	22	-	-

The Sophistication of Body Proportioning Scale. We considered the aspects of the drawings which are taken into account in the scales mentioned in the previous section. It seemed clear that besides aspects like form level and detailing the proportioning is of importance e.g. 'Grossly unequally sized arms, legs, ears, fingers, etc., combined with primitive form, uncontrolled lines' (Witkin et al., 1962, 1974, p 119). We therefore decided to stress this aspect of the drawings which is clearly very little influenced by size and by the degree of detailing which is possible. The scale which was designed for our purposes was called The Sophistication of Body Proportioning Scale (S.B.P.S.) (see Table 4.3).
There was one special aspect we realized could distort the findings. The proportioning of Pygmies is somewhat different than that of the Bangandu. Besides the obvious difference in size they are broad shouldered with a sturdy trunk and relatively short legs. We discussed this with the three people going to score the drawings and showed them pictures of Biaka and Bangandu. We then asked them to score each drawing twice, once taking into account that a

Table 4.3 Sophistication of Body Proportioning Scale

1.	Drawing least sophisticated, round or straight line and/or dots.
2.	Arms or legs represented and connected with head, little proportioning.
3.	Arms and legs connected with body, some proportioning of parts.
4.	Arms and legs well proportioned and fixed to body on proper place.
5.	Arms, legs and some more parts presented are well proportioned (more detail is only credited if the proportions are correct; if not score 4 is given).
6.	All parts represented (or partly covered by clothing but detectable) are well proportioned without exception.

Biaka had drawn it and once imaging that a Ngandu had made it. They of course scored blindly. Afterwards we took for each drawing the appropriate scores and added the scores assigned by the two judges who showed the largest inter-rater agreement. This was r = .57 for the "Bangandu Scale" and r = .71 for the 'Biaka Scale'. The coefficient for the Bangandu Scale is low. These coefficients are the figures of all scores together i.e. each drawing being scored in both ways. Afterwards the appropriate scores for each drawing were selected and the ones of the drawing of a man and the drawing of a woman were added to make one single score for each subject.

The Block Design Training Task. As a check on the reliability of the Block Design Training Task we calculated the item test correlation by taking the number of trials needed on each item and correlating this with the total number of trials on all nine items for all subjects. The coefficient of homogeneity was alpha = .71 which is not unsatisfactory for purposes of group comparison.

CHAPTER 5: TEST CONDITIONS

5.1 Test Conditions, the Field Laboratory

During the periods in the field the research team was allowed to use a wooden house in the centre of the village of Bagandu. It was generously offered to us by the Mayor of the community. It was situated at some distance from the small wooden town hall and the other houses and close to a large open square which was considered the centre of the village. The three roads through the various villages came together here. Opposite the square was a small brick dispensary and the nurse's residence, also brick.

Testing with the cognitive style tests using family and community samples was carried out underneath the wooden house in an improvised permanent lay-out. The idea behind this lay-out was that a subject should never have the impression of being "alone" with the researchers. There were two benches on which subjects were asked to sit while they were waiting. From there they could more or less watch what was going on. This was done especially to make clear to the children that nothing threatening was happening. There was no possibility, however, for them to see the pictures or to obtain actual information about the content of the tests in any way. On almost every occasion other people who were not subjects accompanied the persons involved in the study. This was particularly evident when a father, mother and child triad was invited and the whole family would come along, especially in the case of the Biaka. We often made use of the children's curiosity by asking future subjects who were "on the list" to join other children. In this way we were able to ensure that a child felt at ease before we started trying to test him. In the case of one Biaka boy this took three mornings of him just being around before, on the fourth morning, we finally felt that we could safely test him. In general, however, about one hour was sufficient for a child to feel at ease.

Testing always started with presenting a simple eye test. On a sheet of paper small figures were drawn. These figures were like the Landolt rings but of various kinds. They gradually became smaller. Just as in the case with the rings, each figure had an opening at one of the sides. The subject had to point to this opening with his finger. The reason was twofold. First it served as a check on the vision of the subjects. If they could do all the items of this test, it was clear that presenting the other tests would not be hampered by a lack of eyesight. All the subjects were quite able to do this test, even the smallest figures could be distinguished without any problems. We, of course, did not invite the few people who were obviously more or less blind. One village father appeared to have

only one eye. As this eyesight appeared to be very good, he was presented all the tests except the P.R.F.T. and B.A.T. where the vision of depth can play a role. The other purpose of presenting this test was to put the subjects at ease with a test which was easily understood and the meaning of which could be made fully clear before testing started. A Biaka boy who was afraid at the start had the eyetest explained to him by his father at our request. After he had taken this test he got more confident and did the whole series of tasks, apparently at his ease.

One particular fully shaded spot was always used for the P.R.F.T. This test was always presented by the same researcher. At a different table another researcher presented the A.E.F.T. So testing took place with two subjects simultaneously. When the Tower Building Task for the observation of parent-child interaction was to be administered, the researcher and one assistant, Mr. Lamine, went to the side of the house taking only the subjects with them. The lay-out for the Tower Building Task was set up in the open air. To realize the same arrangement at any time of the day the film camera and the tape recorder were installed inside a room to protect them from direct sunlight. During the observation no one was allowed to come to that side of the house. We also did the Sand Drawing and the Verbal Task in the same spot as the Tower Building Task. For these tests we naturally ran the greatest risk of giving cues to other people who, as subjects, might be influenced in their performances.

The people in the village soon learned that during the hours the researchers were occupied under and around the house it was not convenient to drop in. Of course it often happened that someone approached the house during this period. In such cases one of the researchers, but mostly one of the assistants, or Mr. Dimanche who attended to the household duties, quickly went to the visitor. They explained that everybody was busy and asked if the person could come back later on. If this was not possible the person was asked to sit down and wait until one of us could interrupt his work for a moment. The combination of being welcomed even at a distance of some thirty meters and yet being prevented from interrupting the activities appeared to be acceptable to everybody and did not seem to cause any resentment.

5.2 Social Relationships in the Field

When we arrived in the area where the work was to be done, we explored the region for a good place to start the pilot work. We were introduced to the community by Dr. Cavalli Sforza. His knowledge of the field made our task easier

than expected, because he was known to the authorities who had to be consulted and asked permission to stay and do research and also to the people living in the region where he had done research in the past. After having visited Bagandu and having met the mayor and some of the village chiefs we decided it would be better not to start the pilot work in the centre of the community. To avoid contaminating the future sample with information, especially concerning the test procedures and observation methods we went to Lotemo halfway between Loko and Bagandu. We settled in a wooden house generously offered and repaired by the S.C.A.D. plywood factory, which was itself situated north of the Lobaye river. They also cleared the road of fallen trees, all the way from Loko to the small Lotemo river. As the Lotemo bridge was no longer reliable, the road from Loko to Bagandu, an important connection in the past but now almost unused, had been rather neglected. The pilot work was done with subjects from the Lotemo region where a few small settlements of Bangandu and several Biaka camps were situated. The people from the villages alongside the road together with people from Bagandu took care of repairs to the road between the Lotemo bridge and Bagandu. This was done partly because it facilitated transporting the coffee crop but also for the research team.

The medical assistance to the local people provided by us was gratefully accepted. (A rather large quantity of medicine and equipment was provided by the Dutch Catholic Mission, Tilburg University and two pharmacists.) During the third field period these activities could be limited almost entirely to supplying medicine to the well-trained local nurse who, in the meantime, had been sent by the Mbaiki Hospital to work in the small dispensary in the centre of Bagandu. It should be noted that everybody who asked for medical help was given all the assistance we were capable of providing and that it was not limited to people involved in our study like assistants and subjects. In the second and third field period the research was done from the centre of Bagandu which served as a base.

Living in the village was a pleasant experience and relations with the local people were very amicable. This is a very subjective standpoint as it is always difficult for an anthropologist (e.g. Turnbull, 1962) but also for a cross-cultural psychologist to evaluate his own social position in the local society. The relations with the local people were of great importance. It would, for example, have been unwise to try to test Biaka pygmies in the village without asking the permission of the "owner" with whom they have a special economic and social relationship. In practice this did not mean that we had to ask his permission on every occasion but he had to know about it. Another important point was that the assistants who worked with us and the other members of the research team of the Differentiation Project were people from the villages and

respected socially. At the end of both the second and third field period there was a ceremonial dinner, offered to the research members by the mayor with all the local dignitaries present. It was customary to refer to the research team as the "Service Scientifique de Bagandu". The attitude to the team can best be illustrated by an anecdote. In June 1976 a large gorilla was killed in the plantations. It had severely wounded a Pygmy who was given first aid and was transported to the hospital. Two days of festivities, both by Biaka and Bangandu, followed the killing of the gorilla. The animal was divided up according to the traditional pattern (Bahuchet, 1978) and parts were presented to several people. The meat of the pelvis was divided into six parts, one for each of the five neighbouring village chiefs and one to us for "le chef des blancs", which was the team member who was in the field most, together with his family, and who acted as spokesman when necessary.

Every subject was given a small reward after having worked with us. A choice could be made from cigarettes, soap, salt or peanuts. When testing children we often provided them with some peanuts or bananas between test presentations and when waiting.

CHAPTER 6: CHILD SOCIALISATION

6.1 Child Rearing and Cognitive Style

In the literature on field independence and socialisation, even in the earliest stage of research in the domain of field independence, it was conjectured that the individual differences in this cognitive style variable could be shown to be related to variations in early experiences. If Span (1973) is correct when he points out that already this early the idea was expressed that cognitive style has to do with the ego-control system, it seems only logical that socialisation practices should become a topic of concentrated interest. We shall give a short survey of the findings.

When considering the large number of studies on socialisation and field independence one realizes that this heading covers a wide variety of studies. In their monograph on cognitive styles Goldstein and Blackman (1978) include a chapter on field independence in which they summarize under "Mother-Child Relations" the study by Domash and Balter (1976): "Sex and Psychological Differentiation in preschoolers", as well as the study by Elliot (1961) concerning "Interrelationships among measures of Field dependence, Ability, and Personality traits". Goldstein and Blackman come, despite the difference in approach, to the same conclusion as Goodenough and Witkin (1977b), namely, that parental encouragement of autonomy leads to greater field independence in the child. Then they remark that "autonomous functioning in the child is not always related to the child's level of field independence" (p 192). One may ask if they have not been rather selective in their choice, i.e. deciding not to review the cross cultural studies. It seems to us that only when we use a somewhat wider approach can a general trend concerning autonomous functioning of children and their degree of field independence be shown or probably be refuted more clearly.

The socialisation practices of a certain culture reflect what is seen or felt as being pertinent and important characteristic ways of behaving. We say "felt" as we cannot expect that parents will always be able to state explicitly just what properties of their child's behaviour they would like to develop. With regard, in particular, to those aspects of behaviour which are directly related to a shared view of all the members of a cultural group, we can expect that it will seldom be realized that one can even think about disagreement concerning these matters and that, as a result, one cannot point out when asked what the aims of education are.

The early work of Witkin and his associates (Witkin et al., 1962, 1974, Dyk & Witkin, 1965) pointed to en-

couragement of autonomous functioning in the child as an important determinant of a field-independent cognitive style. Although these studies were of an exploratory nature, the general picture of these studies is one of field-dependent mothers limiting the activities of the child and trying to maintain control over its behaviour. Assertive and aggressive behaviour is discouraged, especially its expression. Remarkable is the resemblance between the socialisation practices towards daughters and field-dependent sons of mothers who had both sons and daughters. The method used in these studies, the direct report by parents with the aid of interviews, has been repeated many times since. An early and elaborate study by Seder (1957) remained unpublished. Witkin et al. (1962, 1974), who give a detailed account of this study, report that she also found that coercive child rearing practices, stressing conformity and authority and the punishment of assertive and aggressive behaviour, were characteristic of the socialisation by the parents of field-dependent children. Witkin et al. describe the outcome of the tests of each stated hypothesis. It is remarkable that when discussing the outcome of the first of Seder's hypotheses they point out that use is made of the mothers' recall of early events. They indicate that such memories may not always be accurate and that for this reason they based the judgements of mothers fostering field (in)dependence on attitudes expressed rather than on facts reported. Later on Witkin and Goodenough (1981) were to point out that in the studies on the relation between child rearing practices and cognitive style in children, those studies making use of general measures of parental attitudes towards child rearing have not shown consistent relationships. On the other hand, significant relationships were usually reported to be found when the parents' actual behaviour was studied.

A real problem in socialisation research is the rather vague content of concepts. The definition of the terms in the socialisation part of the equation seems less adequate than that of the cognition part. There is considerable agreement about the concept of autonomy but as regards the other terms it seems clear that there is a lack of consensus of opinion at least as far as the operationalisation is concerned. To give an example: the wellknown study by Barry, Bacon and Child (Barry et al., 1957) on sex differences in socialisation can be considered a milestone in cross-cultural psychology. For the first time a set of complex concepts was investigated in various cultures; concepts thus far approached mainly by way of participant observation or by global analyses of the material as presented in monographs written for different purposes by cultural anthropologists. In this study a large scale quantitative analysis was made, with the aid of many detailed ethnographic reports. It could be concluded that

there is a pattern of greater pressure towards nurturance, obedience and responsibility in girls. On the other hand, boys are educated towards self-reliance and achievement striving. One would assume that responsibility is far more compatible with these last two characteristics than with obedience! This study has stimulated more interest in these matters which has eventually given rise to several careful observational studies within various cultures and quasiexperimental and experimental research in the field itself. Considering how the, subsequently popular, key concept of "responsibility" is defined in this study, one realizes how problems can arise and that it is not surprising that findings are sometimes not confirmed in later studies. The authors speak about responsibility or dutifulness training. They add: "the data were such that training in the performance of chores in the productive economy was necessarily the principle source of information here; however, training in the performance of other duties was also taken into account when information was available" (p 640). If the concept was operationalized in this way in an industry in our own culture we would certainly object.

Despite the small inconsistencies in the studies discussed, which are probably due, at times, to differences in definitions and methods used, the general picture presented by Goodenough and Witkin (1977) is one which clearly indicates a relationship between field dependence and overprotective socialisation practices which emphasize strict rules. We would like to emphasize that uncertainty about the rules on the part of the child and parental arbitrariness in applying them could be especially conducive to field dependence, and even more so than the application of harsh but well-defined rules.

This is consistent with the results of the early study by Dyk and Witkin (1965). A projective test was used here and it is clear that in their responses field-dependent boys described parents as being arbitrary, rigid and tyrannical. It seems that the personality of the parent and the whole educational climate is of importance. This conclusion is not affected by the observation mentioned above that questions pointing to actual parental behaviour show a clearer picture than attitudinal questions. Attitudinal questions are much more open to distortion. They are probably also much more difficult to assess when the core of the attitude under investigation consists of arbitrariness and inconsistency! Elliot (1961) uses "a conception of field dependence that considers the primary reference of the construct to be a tendency to react with affective disruption and intellectual deficit to an external situation that lacks clear structure and instruction" (p 36). It could be that this reaction is a sign that a person has a less structured set of controls when confronted with a situation in which he has to impose structure upon the elements of the context, whether it is of a cognitive or of

a social nature. Elliot's view of field independence as "a more direct index of internalisation and autonomy of complex cognitive processes than of personality traits and motives" (p 36) has not gained much support since.

In Witkin and Goodenough's (1977a) review of field independence and interpersonal behaviour it becomes clear that one of the most important characteristics of field independence is that particular attributes are identified as one's own and recognized as being distinct from those of others. The possibility of bringing structure into a context is the direct impact of attributes which are identified as one's own. It is not known in how far the process of structuring is a conscious one; but this, in fact, is of no importance. The field-independent individual has the possibility of making use of his own more structured system. There is evidence that (re)structuring can be learned to a certain degree (Witkin & Goodenough, 1981). It seems that one can influence the field independence of children by formal training but also by adoption of a certain style of childrearing.

The fostering of autonomy seems to be an important variable. This is a determinant. which can be identified within our culture by the fact that it is a non-uniform pattern of emphasis on a certain kind of behaviour and one producing a diversity among people. In other words, because there is at least some variation, it can be spotted. It is not unlikely that there are educational influences which are implicit in a given culture at a given time and which are very homogeneous in that culture. There are possibly even several determinants of field independence in the socialisation process which happen to be totally unexplored yet. One could call these "hidden" determinants. However, a further distinction should be made. A determinant can be, as yet, undiscovered because it relates to a culture which has not played a major role in the composition of the body of knowledge available to psychology. It is also possible that it is "hidden" in the sense that in our culture a determinant is already playing a role in the life of every single child but that it has not yet been recognized as being important. While it is so closely bound to our own culture we fail to realize that its impact could in fact be different for every individual child. The "routing concept" is such a determinant, which was unnoticed for a long time. It is mentioned here as it is pertinent to formal schooling and thus to western culture. There might be variables comparable to it in non-western settings.

Witkin and his associates use the concept of routing to explain the heavy emphasis on verbal skills in both test construction and schooling. Verbal competence is emphasized to such an extent that children who are verbally normal or above normal are sufficiently compensated for any deficit in spatial development during their school years. The relatively poor development of analytical skills is not

noted in this period. The opposite is not true. A lack of verbal skills has a direct and important impact on school results and their evaluation. The handicap of poorly developed spatial abilities, however, may only emerge in later years. The reason why we discuss these "unnoticed" determinants so elaborately is that there may be determinants which stay hidden when only one culture is investigated but will be discovered when different cultures are compared. Sechrest (1977) places considerable emphasis on this aspect as a core of cross-cultural psychology.

The relation between culture, ecology and field independence has already been outlined in chapter 1. The general picture is one of the hunting-gathering societies socializing towards independency and the agricultural and pastoral societies stressing dependence and social sensitivity. Across cultures, a set of characteristics of parents and, in general, of families of field-independent children can be discerned. It is not our aim in this study to draw a distinction between the general, culturally determined styles of educational effort and more individual ways of socializing. Ideally, one should be able, in the future, to differentiate these two and to characterize a family as to its personal variant of the style of childrearing of its own culture. At the moment this situation is still a long way off.

Domash and Balter (1976) in a study with young, white New York City children reported a trend with girls, and girls only, namely that maternal authoritarianism is related to lower levels of psychological differentiation. Relating these findings to former studies (Witkin et al., 1962, 1974, Block & Block, 1973), they draw a parallel with Maccoby (1966) who concludes from many studies that "analytical cognitive style" is positively correlated with receiving more autonomy, but this only applies to girls. Boys, whose impulsiveness needs more control, would be more stimulated by a parental attitude which she called "authoritative" following Baumrind (1971). The most important aspect in this concept of authoritativeness is the element of structured guidance in contrast to the arbitrary character of the attitude called "authoritarianism". Goldstein and Blackman (1978) concluded from a number of studies that there appears to be a significant relationship between authoritarianism and field dependence. There are several studies to support this hypothesis e.g. Rudin and Stagner (1958), Bieri (1960), and Clark (1968). The results of Ridgeway's study (1977) appear to contradict those of Bieri's in particular, but in fact hardly challenge the findings. The methods used are rather different which makes results difficult to compare although considerable differences are claimed. What she seems to do is difficult anyway: to take young adults and full adults and generalize from an acceptance of authority and the perceived similarity to the opposite sex parent towards the authoritarianism of their parents and the field

dependence of the children they once were.

From a conceptual point of view it is not unlikely that in many cultures children perceive something like an authoritarian parental attitude, merely as a matter of being confronted with clear and pertinent guidelines for behaviour. In other words, authoritarianism as a factor of possible importance in the development of field dependence can be thought of as operating at an intergroup level but not as a determinant of group differences in all circumstances. The whole matter is complicated by the fact that the concept of authoritarianism is so complex that it is unlikely that it will become a manageable variable in cross-cultural research in the near future. The relation between "potestas" and "auctoritas" is a very complicated one and seems to differ from culture to culture. An elaborate study of these concepts and the meaning attached to them would have to preceed any attempt at cross-cultural comparisons. Osgood's (1977) approach seems fruitful in order to learn what these terms represent in the "subjective culture" of each group concerned.

Witkin and Berry (1975) describe a study by Meizlik (p 36) who demonstrated how, within a cultural group, the generally found pattern of women being more field dependent, can change when subgroups differ considerably in upbringing. In the traditional orthodox Jewish families which she compared with modern orthodox families, women appeared to be more field independent when tested with the Group Embedded Figures Test. One reason was assumed to be the active responsibility for family affairs which kept the men free for intellectual activities. The fact that, for the modern orthodox students, the difference was in the same direction, but not significant, needs not surprise us. In the process of secularisation and acculturation the style of upbringing and the atmosphere in the family has probably not been fully changed to the pattern typical for the modern American majority. One can also say that the option to utilize a field-independent style of behaviour is not easily extinguished.

Dershowitz (1971) has shown how traditionally educated Jewish boys are more field dependent than more Americanized Jewish boys but both Jewish groups are more so than Protestant Anglo-Saxon American children. It should be noted that Meizlik's findings do not contradict Dershowitz's findings and that it would be unjustified to make conclusive remarks before the various variables have been included in a single multifactorial design.

The study by Dinges and Hollenbeck (1978) clearly shows the aspect of choice which is inherent in field independence but now operating at group level: "It is unclear whether individual autonomy and self-reliance or group allegiance and conformity were more effective survival strategies. It appears that a complex integration of both strategies may have led to greater probability of survival" (p 218). The Navajo children in this study

appeared to be field independent when tested with the C.E.F.T. at least when compared with the original New York sample. This seemed in contrast to their education with its rigid restriction and acquiesence. The authors suggest a multifactor determinant of the test performance. They point to the fact that family organisation alone is not enough to explain cross-cultural differences in field independence. As a consequence they stress the need for multifactorial designs for further research.

We assume that children in a culture which stresses one pole of the dimension of field dependence-independence in one way or another will undergo this influence partly in the same way as adults do. Probably both parents and children are mainly influenced by other adults; in other words, by the group norms. The children are also directly tutored by the parents or by parent substitutes who have a well-defined role. The children are confronted with direct verbal and other behaviour towards them which is an expression of the parent's personality and cognitive style. Dyk (1969) points out that the results of the study "suggest that a mother's interaction with her baby is in part a reflection of the degree of differentiation of the mother herself." (p 689).

Laosa (1978) did a study with Mexican-American mothers and their kindergarten children. The mothers and children were observed while the mother taught the child to do a cognitive-perceptual task: putting together a Tinkertoy according to an assembled model. It was shown that mothers teach their children by using a strategy "that is likely to stimulate in the child the development of a cognitive style similar to her own style" (p 29). It was also shown that field-independent mothers used more inquiry and praise and that field-dependent mothers used modeling more. This is in line with the findings of Busse (1969), who pointed out that mothers of field-dependent boys used more commands than mothers of field-independent boys. In the mother and child study by Kirk and Burton (1977), carried out in Kenya, it appeared that mothers of field-independent children used more task-related gestures and were also more specific in their teaching behaviour, using relatively more single-finger or single-hand movements. Witkin and Goodenough (1981, p 84), however, realizing that other studies show a less consistent pattern, see two general hypotheses reflected and, to a certain degree, supported. First, "that parents of field-dependent children will be more strict and dominating than parents of field independent children". The second hypothesis "is that parents of field-dependent children are less constructive in their teaching behaviour than parents of field-independent children". They see a problem in the fact that "constructive training and domination may be expressed in the same behavioural dimension" (ibid, p 85). Busse's (1969) discovery of a non-linear relationship between the amount of

parental manipulation of the task material and the degree of field-independence points to the possibility of the need to distinguish between, on the one hand, being helpful and, on the other hand, taking over the task. A possible solution for this problem might be to analyze an interaction task not only in terms of helping behaviour but also in terms of stimulation by the parent of independent behaviour. The latter is characterised as helping as little as possible and then only when needed, with little interference with the child's own activities. It would be interesting to see how this stimulation of independence relates to just helping as such, whether needed or not. One would expect the specificity of the help to be of importance too. It is likely that those parents who are field-independent and who foster field independence show more specificity in their teaching behaviour. The task relatedness of the gestures Kirk and Burton (1977) describe could well point to specificity of the information given during the training. It seems that this aspect lends itself to an analysis of the exactness of the content of the verbal behaviour. Furthermore, it can be expected that parents who are more field dependent talk more during an interaction task regardless of the specificity of what they say. Both the more obtrusive character of field dependence fostering parents and the fact that field-dependent people tent to be more sociable lend support to this hypothesis.

Witkin and Goodenough (1981) reviewing a number of studies in which reinforcement is discussed, conclude that field-dependent children tend to be particularly responsive to negative reinforcement in learning situations. We wonder whether it would be possible to make a distinction between negative and positive verbal behaviour in an interaction task and to make a direct comparison with the degree of field independence of the child. One would have to take into account the relative number of negative and positive remarks during the interaction task as they are mutually exclusive.

When reviewing the relevant literature it appeared to us that a standard observation of the interaction between parents and children would offer the best opportunities for a test of various hypotheses about the conditions leading to field independence. We will turn to this observation in the next section.

6.2 The Tower Building Task

6.2.1 The Task

The Tower Building Task was intended as a standard instrument for the observation of parent-child interaction. Two requirements had to be met.

First, the task had to be equivalent for both groups,

Biaka and Bangandu, and for both sexes. This meant that it could not include activities which form part of the behaviour repertoire of only one group or which would be typical of only some members of one group but all the members of the other group. For example, a task assessing the acquisition of hunting skills by children would be appropriate for all Biaka father and son dyads but only for some Bangandu father and son dyads and even then comparison would be difficult as it seems that the village boys who learn to hunt get part of their training from the Pygmies.

On the basis of our experiences during the first two field periods we decided to adopt a task which was not part of the daily routine of the people concerned but which was new to them and could also be introduced as being new. The reason was simply the non-existence of a routine interaction situation which was the same for both groups and for both sexes and of which we could reasonably assume that we would have the possibility of observing it. One possibility would have been to observe "sharing a meal". However, to be a witness to this event a sufficient number of times would have taken too long. The schedule for meals not being very tight it would have meant spending much time in Biaka camps which are scattered over a rather large area, waiting for an opportunity to observe. Providing a meal and thus creating the situation desired was not considered, as it would have meant introducing many new variables, especially for the Biaka.

Secondly the task had to be relatively easy in order not to discourage the children especially the Biaka girls who, as we had seen, tended to refuse to do a task which seemed difficult to perform. On the other hand, the task had to be difficult enough to make at least some assistance from the parent likely. It should be reminded that the age level had been selected partly on the basis of expected test performances. During pilot work with the T.B.T. we first motivated the subjects by promising a gift proportional to the performance of the task. However, we decided to drop this as it appeared to be unnecessary and because there was the risk of introducing unwanted elements. In African cultures the stress on personal achievement is not as high as it is in Western cultures and certainly not so closely associated with the idea of being rewarded as an individual.

When introducing the T.B.T. the parent is asked to sit down on a chair. In front of him is a little wooden bench (size: length 40 cm., width 25 cm., height 17 cm.). The bench is levelled carefully. The distance between the parent and the bench is adapted to his physical proportions. Sitting on the chair he can just touch the middle of (the surface of) the bench. The child is asked to stand in front of him. To the left of the parent the blocks to be used are piled up (sizes 7,5 x 3,5 x 13,5 cm.). The assistant stands behind these blocks during the instruc-

tions. The research worker stands to the right of the parent. The instructions are given by the research worker in French and translated by the assistant into Dingandu, Diaka or, on some occasions, into Isongo. "I would like ... (name of the child) to do a little bit of work for me. I shall show you. I shall ask him to construct a high thing, in this way. (The researcher puts two blocks on the bench smallest side down and puts a third on top in a flat position, then adds a second "floor" and a third.) This is how it goes: this one here, this one here and this one here. Well try it yourself ... (name of the child). (If necessary the child is helped. The parent is neither encouraged to help nor discouraged to do so.) This was just to explain how it works. Now we shall start again. When the work is done I always give a present to the child and also to the father (mother). Do you understand what you have to do? (The blocks are put back on the pile.) Well, you start building "a tower" ("a high thing") as high as possible! (The researcher raises his hand very high to indicate that the tower has to be high.) You start when I am over there, (the place where the camera and tape recorder are, is indicated), and when I have said: All right? Begin! Is everything clear to you? Fine". It should be noted that this was the standard instruction. When necessary the researcher acted according to circumstances. Deviations from the standard procedure were rarely necessary however. When the camera and tape recorder had been started the research worker waited at a distance and looked but did not give any comments. After three minutes the camera was stopped but recording on tape went on until the moment the task was finished. The task was considered to be finished when: 1) The subjects indicated that the work was ready and the tower completed. (This happened rather often); 2) The tower was not finished but the subjects made it clear that they wanted to give up. (When subjects stopped and waited, the reseacher waited silently for fifteen seconds and then said: "You can go on!" (It should be mentioned that "one can" when translated into Diaka or Dingandu has a connotation of "you must" rather than "you are permitted".)

When a T.B.T. had been recorded on film and tape, the film was sent to Holland to be developed and stored. The tapes were translated in the field. Most of the time a tape made in the morning, during the test session, was translated in the late afternoon. The two assistants Mr. Gnagnomat and Mr. Zikobo usually worked together and when only one of them was available his translation was checked by the other assistant later on. Only once was the help of Mr. Lamine needed, when subjects appeared to have spoken Bofi, the language of the region where they had lived for some time when the child was growing up. A few parent child dyads spoke Isongo, when interacting freely, but most of them spoke either Diaka or Dingandu.

When the task was completed or stopped the researcher

went to the subjects saying: "Well, it is finished, it is very good! Really very good", and asked the parent and then the child the following four questions: a) Who did the work? b) What did the father (mother) do? c) What did ... (name of the child), or "you" do? d) Did the work go well? The reason was to check whether the subjects had understood the task. We never had the impression that the task had not been clear for either a parent or a child.

Eventually the number of films and tapes for each group was: Pygmy boys, fourteen films and fifteen tapes; Pygmy girls, eight films and thirteen tapes; village boys, twelve films and eleven tapes and village girls, twelve films and fourteen tapes. We did observations with nearly all subjects but not all the information gathered could be used, due to technical problems with tape recorder and camera and finally by the theft of a number of films at Tilburg University. It should be stressed that any relation between any variable relevant to the research and the content of the information which was lost is unlikely. To make sure, we compared the performances of the group of children for which we had both filmed and taped material with the group for which we had only taped material. On the three variables for which we were able to make comparisons there was no significant difference.

The translation was written out as literally as possible. To attain this we worked out the first tapes together with the assistants. Timing of the tapes in units of twenty seconds was done by us partly in Bagandu, partly in Holland. The scoring of the texts was done by an independent judge. We chose to have the translation written up in utterances. This appeared to be quite possible during pilot testing. There is some arbitrariness in this choice but all of us felt quite confident about it and it appeared to everyone that the remarks, phrases and exclamations had a very natural distinctiveness both when heard on the recording and when read in the translated script.

6.2.2 The Interaction Aspects of the Tower Building Task

In the rather unstructured situation of the Tower Building Task parents and children are expected to interact verbally. We think that parents use the opportunity offered to inform the child how to work. We expect that field independence fostering parents give more specific and detailed information, as they are relatively more able to discern the specific points and instances where one can act, lend a helping hand, or intervene most effectively. They are able to examine the situation and find the instances leading to success or failure. This is why we analyzed the utterances by the parent in order to determine the specificity of the information provided to the child. All utterances were recorded and each one was scored with the aid of a 5-point scale according to Specificity of

Information of Utterances (see Table 6.1). The total score was divided by the number of utterances of the parent. We expected to find a positive correlation between this score and the scores on the tests of field independence. Thus hypothesis one, tested with the aid of this parent-child interaction task, is: The correlation between the child's degree of field independence and the relative specificity of the information provided by the parent is positive.

Table 6.1 Specificity of Information of Utterances Scale

1.	General remarks, not relevant to the task, e.g. it's sunny.
2.	Relevant to the task, but general, e.g. hm, yes, no, do it well.
3.	Relevant to the task and referring to actual situation, e.g. it will fall, it is crooked, upright.
4.	Relevant to the task, giving one general indication, e.g. like that, place other blocks, come closer.
5.	Giving information about how to handle a single block.

Since the Tower Building Task is a rather easy task to perform, the final performances of field-independent and field-dependent children cannot be expected to differ very much. (This performance aspect will be described in section 6.2.5). It is also possible that some produce the same results as the others do, but receive more help. We will look at these interaction aspects. It is not unlikely for field-dependent children to get more help. Where the help was less specific it could have been more extensive in the sense that more utterances by the parent were needed. So we will have to look at the relative amount of help. Regardless of whether the information provided by the parents to the child can be considered as a negative or positive reinforcement, each utterance means assistance. Field dependence fostering parents seem more involved in the interaction with the child in the sense that they are more dominating, obtrusive and controlling. We expected this tendency to express itself in more verbal activity by the parent. Besides actual helping behaviour, observed with the aid of films, the total amount of verbal assistance could be checked by calculating the total amount of utterances. The outcome and the time needed for the task will be left out of consideration as we will only examine the average number of utterances over periods of 20 seconds calculated for the whole task, regardless of how long the parent-child dyad was working. Thus hypothesis two tested with the aid of the T.B.T. is: The correlation between the child's degree of field independence and the amount of information (regardless of the specificity of this information) is negative.

If parents who are fostering field independence tend to use more positive reinforcements when socializing we expect that this tendency will also reflect itself in the interaction during the small-scale Tower Building Task. We will therefore check what proportion (percentage) of the total number of utterances can be seen as positive. Positive utterances are those which give information or tell the child what to do: positive remarks, the word "yes" and "positive hm's". The term "positive hm" refers to the sounds very similar to those which are considered approving in our culture. (Even in the sense that they are used deliberately by psychotherapists to reward their clients for cooperating.) It is quite different from what we shall call the "negative hm", a disapproving "ouhn" very common in Bantu languages. We left the decision of classification to our assistants whose evaluations were very decisive and who showed clear agreement when translating the audiotapes. Hypothesis three to be tested is: The correlation between the child's degree of field independence and the amount of positive utterance of the parent is positive.

The use of negative reinforcements in the socialization process seems to be more characteristic of field dependent people. This could lead to a rather low level of field independence of the children. We consider as negative those utterances which prohibit action, "negative hm's" and negative remarks. As a score for an individual parent we use the percentage of the total number of utterances which can be seen as negative. Hypothesis four to be tested is: The correlation between the child's degree of field independence and the relative amount of negative utterances of the parent is negative.

One could argue that some parent-child dyads will show more verbal interaction as the children feel freer to talk to the parent in the presence of the researcher. One could even point out that the field-independent ones, in particular, are less influenced by the presence of the researcher. We tend to think that our relations with the subjects were such that such a specific effect of our presence on the subjects could be discerned. A possible approach to this problem is to see if there is a correlation between the amount of verbal utterances and the degree of field independence. For this purpose we determined the average number of utterances of the child for each 20 second segment in the whole task. We take the utterances of the child as parents appeared to be less shy in our presence. The researcher's influence on the subjects would show itself most clearly in the child. Hypothesis five to be tested is: There is no relation between the average number of utterances the child makes and its degree of field independence.

Parents who foster field dependency have, as we have seen, a tendency to overprotect the child. This could express itself in an attitude of helping the child in such

a way that it results, in fact, in the child no longer performing its tasks himself, but simply assisting the parent. So we counted each block actually used during the task and calculated the percentage of blocks handled by the parent. This variable was called Amount of Help. Hypothesis six is: The correlation between the child's degree of field independence and the amount of help it receives from the parent is negative.

We wondered if we could demonstrate a relation between the initiative of the child and its performances on the cognitive style tests. To assess this behaviour we designed a five-point "Own Initiative Scale". Two independent judges watched the films and assigned a score to each parent. The interrater reliability appeared to be high p = .98. (For this scale see Table 6.2.)

Table 6.2 Own Initiative Scale

1.	Parent helps from the start and builds actively.
2.	Parent only builds when work is in progress and the task is more difficult.
3.	Parent only helps and builds when tower is higher than the child can reach.
4.	Parent corrects the position of blocks.
5.	Parent does not correct and does not point to the tower and blocks.

Hypothesis seven to be tested is: The correlation between the child's degree of field independence and the degree to which it is given the opportunity to use its own initiative is positive.

A similar phenomenon which we shall call "Working Alone by Child" is reflected by the number of blocks positioned by the child on its own before the parent interfered by touching a block. We hypothesize (eight): The correlation between field independence and the score on the Working Alone Scale is positive.

Further we asked the two judges, mentioned above, to score the films once again. They made a distinction between whether the parent interfered before the tower was in danger or interfered only when the tower was about to topple over. (They agreed in 91% of the cases.) We shall call this behaviour No Interference. We hypothesize (nine): A positive correlation between field independence and "No Interference" will be found.

A final consideration was whether a global impression of the degree of dependence of the child's performance could be formed and if it would be related with the cognitive style tests. Two independent judges were asked to score each of the films on a five-point scale (see Table 6.3). The interrater reliability appeared to be high (r = .97). We hypothesize (ten) that there is a positive cor-

relation between the scores of the child on this T.B.T. Independence Scale and the degree of the child's field independence.

Table 6.3 T.B.T. Independence Scale

1.	Parent builds, child assists only.
2.	Child and parent build.
3.	Child builds, parent corrects and helps.
4.	Child works and parent assists.
5.	Child works and parent only stimulates.

6.2.3 The Tower Building Task: Results of the Analyses and Discussion

To test the various hypotheses for the interaction aspects of the parent and child's behaviour, as it was observed during the Tower Building Task, we correlated the scores on the variables used with those on the various cognitive style tests. An important factor is that, as we will see in chapter 8, there are some significant group differences on the cognitive style tests. For this reason we decided to analyse the results for the Biaka and Bangandu children separately. See Tables 6.4 and 6.5.

For hypothesis one, there is only one test which correlates significantly with the T.B.T. variable. This first hypothesis relates to the expectation that field-independent children receive more specific information from their parents than field-dependent children. There is support for this hypothesis from only one test, the P.R.F.T. for only one group, the Biaka children.

The situation as regards the second hypothesis is not clearer. There is support for the hypothesis that field independent children receive less help from only one test, the A.E.F.T. for the Biaka children. It should be noted that helping behaviour in the sense of giving information was operationalized simply as talking as such. The talking measured may not all have been of real help to the child.

The third hypothesis was concerned with the relation between the field independence of the child and the use of positive utterances. There is no support for such a relation. The fourth hypothesis which is complementary to the third was not supported either. There is even one high correlation, for the scores on the P.R.F.T. of the Biaka children which goes against the expectation.

As was expected, no significant correlation was found when, to test hypothesis five, the number of the child's utterances was compared with the results of the cognitive style tests. This is not a very firm proof given the generally low level of the coefficients in general but anyhow there is no reason to assume that field-dependent

Table 6.4 The correlations between the Tower Building Variables and the Cognitive Style Tests (C.S.T.) for the Bangandu children (Kendall's Tau).

	A.E.F.T.	P.R.F.T.	B.A.T.	S.B.P.S.	B.D.T.T.
Specificity of Information and C.S.T. of Child Hypothesis 1 Expected sign +	.14 25	-.12 25	.07 11	.00 23	-.20 22
Amount of Utterances and C.S.T. of Child Hypothesis 2 Expected sign -	.00 25	-.13 25	.24 11	-.08 23	.31 22
Positive Utterances and C.S.T. of Child Hypothesis 3 Expected sign +	.02 25	-.11 25	.13 11	.00 23	-.15 22
Negative Utterances and C.S.T. of Child Hypothesis 4 Expected sign -	.12 25	.09 25	-.06 11	.03 23	.18 22
Utterances by Child and C.S.T. of Child Hypothesis 5	.17 25	-.11 25	.00 11	-.21 23	.13 22
Amount of help and C.S.T. of Child Hypothesis 6 Expected sign -	-.39** 23	.12 23	-.57** 11	-.10 21	-.12 21
Own Initiative of Child and C.S.T. of Child Hypothesis 7 Expected sign +	.43** 23	-.08 23	.54** 11	.11 21	.21 21
Working Alone by Child and C.S.T. of Child Hypothesis 8 Expected sign +	.07 23	-.17 23	.41* 11	.28 21	.11 21
No Interference by Parent and C.S.T. of Child Hypothesis 9 Expected sign +	-.09 23	-.13 23	.58* 11	.17 21	.20 21
Independence Scale and C.S.T. of Child Hypothesis 10 Expected sign +	.35* 23	-.14 23	.39 11	.18 21	.27 21

Notes:
1. The Cognitive Style Tests are keyed so that a positive sign indicates field independence.
2. B.A.T. for the boys only.
3. * $p < .05$, ** $p < .01$, one-tailed test.
4. Under the correlation-coefficient the N is indicated.

Table 6.5 The correlations between the Tower Building Variables and the Cognitive Style Tests (C.S.T.) for the Biaka children (Kendall's Tau).

	A.E.F.T.	P.R.F.T.	B.A.T.	S.B.P.S.	B.D.T.T.
Specificity of Information and C.S.T. of Child Hypothesis 1 Expected sign +	.21 28	.22* 28	-.06 9	-.37 16	.08 22
Amount of Utterances and C.S.T. of Child Hypothesis 2 Expected sign -	-.35** 28	-.02 28	-.00 9	.03 16	-.04 22
Positive Utterances and C.S.T. of Child Hypothesis 3 Expected sign +	-.06 28	-.21 28	-.37 9	-.13 16	.03 22
Negative Utterances and C.S.T. of Child Hypothesis 4 Expected sign -	-.04 28	-.16 28	.56 9	.08 16	-.05 22
Utterances by Child and C.S.T. of Child Hypothesis 5	-.08 28	.20 28	.30 9	.27 16	-.08 22
Amount of help and C.S.T. of Child Hypothesis 6 Expected sign -	.01 23	-.19 23	-.36 8	.02 11	-.15 16
Own Initiative of Child and C.S.T. of Child Hypothesis 7 Expected sign +	-.13 23	.15 23	.17 8	.00 11	-.05 16
Working Alone by Child and C.S.T. of Child Hypothesis 8 Expected sign +	.10 23	.00 23	.64* 8	-.06 11	.20 16
No Interference by Parent and C.S.T. of Child Hypothesis 9 Expected sign +	.03 23	.30* 23	.36 8	-.03 11	.06 16
Independence Scale and C.S.T. of Child Hypothesis 10 Expected sign +	-.04 23	-.23 23	.45 8	-.06 11	-.04 16

Notes:
1. The Cognitive Style Tests are keyed so that a positive sign indicates field independence.
2. B.A.T. for the boys only.
3. * $p < .05$, ** $p < .01$, one-tailed test.
4. Under the correlation-coefficient the N is indicated.

children felt less free to talk in this situation.

Hypothesis six points to a relation between the amount of help a child receives and its cognitive style. There is only some support for the assumption that the parents of field dependent children help more. For the Bangandu children the correlations with A.E.F.T. and B.A.T. are significant. Anyhow the picture is a bit clearer than that for the amount of help by talking only.

As regards hypothesis seven about the relation between what was called the Own Initiative of Child and the cognitive style tests the results are two significant correlations for the A.E.F.T. and B.A.T. in the case of the Bangandu children and none for the Biaka children.

Hypothesis eight suggesting a positive correlation between Working alone by Child and cognitive style is supported by two significant correlations for the Bangandu, on the B.A.T. and the S.B.P.S. and one, on the B.A.T., for the Biaka children.

Hypothesis nine which relates No Interference by the Parent and the cognitive style, receives support from only the B.A.T. for the Bangandu children and only the P.R.F.T. for the Biaka children.

Finally it was expected (ten) that a relationship could be demonstrated for the degree of the child's independence of performance as judged by observers on the Independence Scale. One significant correlation was found for the Bangandu children on the A.E.F.T. and none for the Biaka children.

We have to conclude that the support for the various hypotheses is very marginal. The number of significant correlations is only four out of a total of fourty-five for the Biaka children and seven out of fourty-five for the Bangandu children. (For the utterances of the child no significant correlations were expected.) Further two rather high correlations which go in the non-expected direction were found for the Biaka children. When we look at the sign of the correlation coefficients it appears that for the Biaka children only twenty-three out of fourty-five are in the expected direction while for the Bangandu children this number is twenty-five out of fourty-five.

It is, of course, challenging to consider to the relations between the results on the cognitive tests of the parents who did the T.B.T. together with their children; e.g. do more field-independent parents give more specific information when helping their children to perform. When considering the correlations it can be noted that in general these are low. To give a very global picture we shall only mention the number of significant correlations leaving out one of the ten variables, i.e. the utterances of the child where we had no expectations about a relation with the child's cognitive style and where no relation with the parent's cognitive style can be expected. The results are not very striking. For the Biaka only two coefficients are significant when tested (r, two-tailed test). Also for

the Biaka only two correlation coefficients are significant. On a total of fourty-five correlation coefficients for either group these numbers are very low.

Finally it should be stressed that the various variables used for the analyses of the T.B.T. results are not independent. For some it could be argued that they are independent to some extent, like the number of utterances and the amount of actual help, the latter being operationalized by the number of blocks the child has placed before the parent touches one. The variable reflecting actual help is, of course, closely related to the interference by the parent before or at the moment that the tower is in danger of toppling over. It should be realized that although the hypotheses are presented separately, they should be considered as relating several allied observables of the interaction behaviour to the several measurements of cognitive style.

6.2.4 A Factor Analysis on the Tower Building Variables

The variables mentioned in the section on the interaction aspects of the Tower Building Task were submitted to a factor analysis (principal components) after two more variables had been added. These variables were: 1. The number of times the child looked up at the parent's face during the Tower Building Task. 2. The number of times the child looked into the camera-lens during the T.B.T. which was interpreted as looking at the researcher, who was kneeling behind the camera. As will be discussed in another report on the African Differentiation Project, (Berry et al., in prep.), the child's looking up is considered to be a sign of seeking support.

After varimax rotation a three-factor structure is the best interpretable outcome. The first factor is characterized by a high negative loading of the Independence Scale and Own Initiative Scale and by a high loading of Amount of Help. Working Alone loads negatively and rather high. This factor has been called Helping.

The second factor has a negative loading of Specificity of Information and a positive loading of Amount of Utterances by Parent. The variables Looking at Researcher and Looking at Parent had lower positive loadings on this factor which was called Uncertainty. It seems contradictory to what has been said in the section on the interaction aspects, to interpret the loading of Utterances by Child also as Uncertainty, yet it seems that this is in fact the most obvious. In retrospect one could point to the fact that on careful re-examination of several of the transcripts of what was said during the T.B.T., it seemed that the utterances of the child were fairly often demands for help or some kind of complaint like "it is too high".

The third factor was a rather specific one with a high positive loading of Negative Utterances by Parent and a high negative loading of Positive Utterances by Parent.

This factor was called Negative Reinforcement. See Table 6.6 for the factor loadings.

Three factor scores were calculated for all subjects to be used as a kind of summary of the T.B.T. results. (All subjects does mean all Biaka and Bangandu children, boys and girls, but only those subjects for which we had both sound recordings and films, in order not to create possible erroneous effects of too many estimates.) The reason to do a factor analysis on the pooled data of both Biaka and Bangandu children together is that there were no essential group differences on the variables which were used.

Table 6.6 Factor Loadings of the Variables from the Tower Building Task

	Factor Loadings		
	I	II	III
	Helping	Uncer-tainty	Negative Reinfor-cement
Independence Scale	-.89	-.16	-.06
Own Initiative Scale	-.83	-.01	-.10
Amount of Help	.76	-.09	-.06
Working Alone by Child	-.43	-.14	-.02
Specificity of Information of Utterances	-.17	-.67	-.17
Amount of Utterances by Parent	-.06	.64	.18
Looking at Researcher by Child	.24	.44	-.11
Amount of Utterances by Child	-.08	.43	.33
Looking at Parent by Child	.02	.35	-.14
Negative Utterances by Parent	.03	.02	.83
Positive Utterances by Parent	-.07	-.04	-.71
Percentage of Explained Variance	21	13	13

6.2.5 The Performance Aspects

Although the T.B.T. is a relatively easy task, it is not unlikely that some difference in quality of performance will be observed during the work. Field-independent people are often reported to be more apt in tasks requiring an analysis of the situation they are confronted with and in tasks which demand spatial skills. We believe that the qualitative differences in performance can be seen during the performance. For this reason we analyzed the films made of the T.B.T. for several different observables, each reflecting an aspect of competence or effectiveness. (See Table 6.7.)

Table 6.7 T.B.T. Performance Scale

1. The number of blocks positioned, on the first trial, before the tower needs to be supported permanently or falls down.
2. The situation after three minutes, i.e. at the end of the film, according to the performance shown at that moment, scored on a 7-point scale.
3. The efficiency of work. Scores on a 3-point scale indicate whether the child works with one hand only or starts working with one hand initially but later uses both hands, or works with both hands right from the start. (When the task is introduced and shown to the child the researcher works with both hands.)
4. The speed of performance: 180 (being the number of seconds of the film) minus the number of seconds before 12 blocks have been placed; the higher the speed the better the performance.

For these four variables combined, the sum of the standard scores for each child was calculated as a T.B.T. Performance Score. The hypothesis tested here is that there is a positive relation between the field independence of the child and the performance on the T.B.T.

It is clear that there is virtually no evidence for a positive relation between the degree of field independence and the performance on the T.B.T. (see Table 6.8). There is only one significant correlation in the expected direction namely, for the A.E.F.T. and for the Bangandu children only. It seems also that there is some difference between the patterns of the correlation for the two groups, Biaka and Bangandu children.

Table 6.8 The correlation between the score on the Cognitive Style Tests and the Performance Score on the T.B.T. for Biaka and Bangandu children

	A.E.F.T.	P.R.F.T.	S.B.P.S.	B.A.T.	B.D.T.T.
Biaka	.08 21	.25 21	.51 9	.17 7	.15 15
Bangandu	.53 ** 23	-.17 23	-.09 21	-.08 11	-.24 21

Notes: 1. Under the correlation coefficient the N is indicated.
2. ** $p < .01$ one-tailed test.

As we feared that group differences, not only on the

test score, but also on the T.B.T. Performance Score might obscure the pattern, an analysis of variance was done on the T.B.T. results. A significant difference was found. The Bangandu children performed significantly better than the Biaka children ($p < .05$). There was no significant difference between performances of boys and girls, neither was there a significant interaction between sex and culture.

It has to be concluded that, in general, the Bangandu children and their parents did better on this task. We can only guess what the reason might be. It does not seem completely unlikely that motivation aspects may have played a role. It is, however, unlikely that a lack of understanding caused the difference, as we checked this carefully after each observation with both parent and child.

As a check on the possible role of the group difference in the performance task we compared the five correlation coefficients for the scores of the Biaka children with those of the Bangandu children. A test on the differences between the coefficients (Hays, 1973, p 663) showed no significant differences between the five pairs (two tailed test).

It should, however, be noted that the reliability of the scale used seems to be rather low. We calculated the coefficient of homogeneity for the set of four items. It appeared to be .44 (standardized alpha). The low reliability of some tests for certain groups as discussed in chapter 4 may also have played a role.

6.2.6 A Group Comparison on the Tower Building Task

We expected that Pygmy parents would stimulate the independence of their children to a greater degree than the village parents. This expectation is derived from the hypothesis described in chapter 1 that Biaka are more field independent than Bangandu and from the subsequent expectation that this will express itself in an emphasis on (observable) independent behaviour. The other reason is the expectation of a difference based on the outcome of the global analyses of day-to-day behaviour, the interviews and the questionnaire. To check this we used twelve variables of the Tower Building Task for a group comparison. These variables are described in more detail in the previous part of this chapter in the section dealing with the hypotheses about the relation between field independence and the various aspects of the observations during the T.B.T. and the section on the factor analyses of the T.B.T. variables. A non-parametric test, the Mann Whitney U test, was used to compare both cultural groups, the Biaka and Bangandu children. The only significant difference ($p < .05$ two-tailed test) was found for the variable Looking at Researcher by Child. It turned out that contrary to the expectation the Biaka children looked at the researcher more often than the Bangandu children.

We considered doing a multivariate analysis of variance. Realizing that the nature of the variables was so different, we dropped the idea. Three variables, however, were taken which seemed to meet best the requirements for an analysis of variance. The first variable is the score on the Independence Scale: to what extent was the child working by himself and did the parent refrain from taking over the work? The second variable is the T.B.T. Relative Amount of Help, expressed as the number of blocks handled by the parent in relation to the total number of blocks handled. The third variable is the T.B.T. Specificity of Information in terms of the percentage of the total information provided by the parent.

Two-way analyses of variance were executed on the results for these three variables (Tables 6.9, 6.10 and 6.11). The factors were culture (children and parents

Table 6.9 Analysis of Variance on the Independence Score of the Tower Building Task

Source of Variation	SS	df	MS	F	Sign F
Culture: Biaka, Bangandu	9.7	1	9.72	1.58	.216
Sex: boy, girl	4.4	1	4.36	0.71	.405
Two-way Interactions: culture, sex	0.0	1	0.01	0.00	.977
Residual	259.1	42	6.17		
Total	276.0	45			
Grand Mean					6.00
Deviation Biaka boys	N = 15				0.73
Deviation Biaka girls	N = 8				0.13
Deviation Bangandu boys	N = 11				-0.18
Deviation Bangandu girls	N = 12				-0.83

Table 6.10 Analysis of Variance on the Relative Amount of Help of the Tower Building Task

Source of Variation	SS	df	MS	F	Sign F
Culture: Biaka, Bangandu	452.6	1	452.56	0.08	.786
Sex: boy, girl	52.7	1	52.73	0.01	.926
Two-way Interactions: culture, sex	747.3	1	747.31	0.12	.727
Residual	254389.0	42	6056.88		
Total	255601.8	45			
Grand Mean					155.09
Deviation Biaka boys	N = 15				.78
Deviation Biaka girls	N = 8				-10.08
Deviation Bangandu boys	N = 11				.03
Deviation Bangandu girls	N = 12				5.71

being either Biaka or Bangandu) and sex. From the results it was clear that the individual differences overshadow the group differences. Only one out of six main effects shows a significant difference (on the 5% level) between groups, indicating that mothers, when giving information, address themselves to the girls in a more global way than fathers do to the boys. No significant interaction effects were found and the group differences appeared to be extremely small. It must be concluded that there seem to be sex differences (see Table 6.11).

Table 6.11 Analysis of Variance on the Specificity of Information of the Tower Building Task

Source of Variation	SS	df	MS	F	Sign F
Culture: Biaka, Bangandu	0.0	1	0.00	0.00	.998
Sex: boy, girl	226.9	1	226.92	9.44	.003
Two-way Interactions: culture, sex	11.0	1	10.99	0.46	.502
Residual	1177.8	49	24.04		
Total	1417.8	52			
Grand Mean					17.72
Deviation Biaka boys	N = 15				1.72
Deviation Biaka girls	N = 13				-1.58
Deviation Bangandu boys	N = 11				2.67
Deviation Bangandu girls	N = 14				-2.46

6.3 Interviews with Neighbours: Twenty Questions

Much of the socialization in both Biaka and Bangandu societies takes place in "public" and by "others", such as neighbours or siblings. We approached persons who knew the families well and asked them to respond to a questionnaire containing twenty questions concerning the fostering of independence.

6.3.1 The questionnaire

As we have seen in the review of the literature, it is essential that the actual behaviour of the parents should be covered by the interview. When this is done significant correlations between the results on the questionnaires and the tests are usually found (Witkin & Goodenough, 1981). Furthermore, questionnaires which ask about attitudes only seem to be less reliable than the ones covering actual behaviour (Wenar & Coulter, 1967). It is also likely that the social desirability of answers to attitudinal questions plays a role. We can imagine that when parents are asked

for their opinion they tend to distort reality, which could be more difficult if they were asked what they actually do. In addition, it is possible that another kind of social desirability plays a role, that of parental selfprotection. To avoid this, an alternative approach would be not to ask the parent but someone who knows the family well. Even then, though, covering actual behaviour rather than attitudinal aspects may lead to less distortion. The reason here is that such attitudinal aspects while no longer self-protective, may be to a large extent dependent on the interpretations of the informer.

For the construction of a questionnaire, several requirements have to be met. First, we have to limit ourselves to behaviour which is part of the behavioural repertoire of both cultural groups. Second, the behaviour must occur often enough to lend itself to reliable observations about its presence or absence. Third, the aspects to be covered must be relevant to the theory. This may seem a trivial remark, but it has serious implications for the type of activities which can be considered useful. For example, each child in the village is certainly permitted to eat the mangos from its father's tree, but no one is permitted to overeat. Therefore, we had to have some indications that the behaviour covered reflects the more or less arbitrary limitations of the child's behavioural repertoire by the parent.

There are several questionnaires in use for the study of socialization in the development of field independence. They are all based on the original interviews as described by Witkin et al. (Witkin et al., 1962, 1974) and especially by Witkin (1969a) in his study of social influences in the development of cognitive style. Therefore it is not surprising that there is a high degree of resemblance. The content is mostly centered around the three indicators provided by Witkin (1969): indicators relevant to evaluating separation from other, indicators relevant to evaluating control of aggressive, assertive behaviour and indicators relevant to evaluating personal characteristics of the mother. One, unpublished, socialization questionnaire often seems to have served as a basic source of items, (cit. by Gall & Van de Koppel, 1969). In this study the results were factor analysed. Four meaningful factors were found which were called autonomy, tolerance, authoritarianism and neuroticism. Baran (1970), who reduced the 107 item questionnaire to fifty-one items, pointed to seveteen questions of this questionnaire which proved to be the most differentiating. It is remarkable that the main loadings of these items are divided almost equally among the first three factors mentioned by Gall and Van de Koppel (1969). These seventeen questions served as a guideline for the construction of the present questionnaire.

A careful check was made to see whether the general

topics covered by every single question could be compared to any event in the daily life of Biaka and Bangandu children. Of course "face validity" played a role initially. Besides, a questionnaire such as the one we used can never surpass the researchers' understanding of the cultures concerned. Through observation and discussions with assistants and parents from both groups, we found certain suitable topics. Together with the assistants, we then drew up a number of questions in Dingandu, at the same time preparing a translation in French.

Attention was paid to the following aspects of child rearing practices: stressing conformity and compelling the child to obey the parents and the group standards, rewarding dependent behaviour and punishing assertiveness and initiative. Several forms of this questionnaire were tried out, as questions frequently had to be changed or even dropped. Finally a total of twenty questions were selected, written out in Dingandu with the help of two assistants, translated back by the third assistant (who later presented the questionnaire to the subjects) and then put in their final form by common agreement. The twenty questions are listed in Table 6.12.

Only adults belonging to the same social unit (i.e. the clan for the villagers, and the camp for the Biaka) were selected for interviewing. In this way we could be sure that they knew the family well. To further ascertain a sufficient degree of familiarity, only women were asked the questions pertaining to the girls, and only men were asked about the boys. The assistant used a standard form of the questionnaire, reading the text.

The answer was immediately coded and scored by the assistant as "no": (one point); "little": (two points); or "yes": (three points). Participants were advised to answer in this way, but not forced to do so and certainly not discouraged when they answered in another way, using long explications or elaborate answers. When necessary a question would be translated directly into Diaka by the assistant. This happened only very few times as most adult Biaka speak and understand Dingandu very easily. It is important to note that the assistants were unaware of the hypotheses and expectations.

Ten of the questions (items 1, 2, 3, 4, 5, 7, 13, 15, 18 and 19) were keyed for field independence, the other ten for field dependence. It should be noted that answering a question with "a little" is very characteristic of Bantu speaking persons. It is quite normal to hear a person answer the question "is all well?" with "a little". In Dingandu "twa" means "a little" e.g. "edi enjonga twa": "it is rather good".

Table 6.12 Questionnaire Used in Interviews with Neighbours

1. ... (name of child), if his father or mother tells him (her) to go and draw some water, and if ... refuses, does his (her) father or mother accept this?
2. Does ... judge for himself what the best thing to do is?
3. In the evening, when the parents are talking, can ... also participate in the conversation?
4. Can ... go and fetch water (koko leaves) by himself?
5. Can ... choose his own friends?
6. When ... is playing with other children, does he always do what the others do?
7. Does ... know yet how to prepare manioc (cut a bunch of bananas) well?
8. When ... is talking, does his mother often tell him to be quiet?
9. When the parents are talking, do the children have to listen?
10. In the evening when his father (mother) tells ... to go to bed, does he go right away?
11. Is ... (name of mother, father) strict?
12. If ... wants to cut sticks (a tree) with an axe, does his mother (father) say that it is somewhat dangerous and stop him?
13. If ... wants to carry a very heavy bunch of bananas, do his parents approve?
14. If ... is naughty, does his mother (father) hit him?
15. Can ... judge for himself which water is good to drink (which palm trees are safe to climb)?
16. Does ... still need help for most things?
17. In the evening, when people are talking, does ... listen attentively?
18. Does ... know how to fetch manioc leaves (set rat traps) by himself?
19. Does ... know how to do lots of things?
20. Does ... respect his parents?

6.3.2 Results

For every child a score was calculated for the relative fostering of field independence, using the scores on seventeen of the twenty questions. The reason to drop three items (1, 5 and 12) was that these showed no variance at all. Apparently, both Bangandu and Biaka children cannot refuse to fetch water when asked by a parent, can always choose their own friends and are never allowed to use an axe if this seems somewhat dangerous.

When testing for group differences (Mann Whitney two-tailed test) we found a significant difference between Biaka and Bangandu ($p < .001$). The same was true when we tested for the boys only ($p < .001$) but for the girls the difference was not significant. For the means and standard

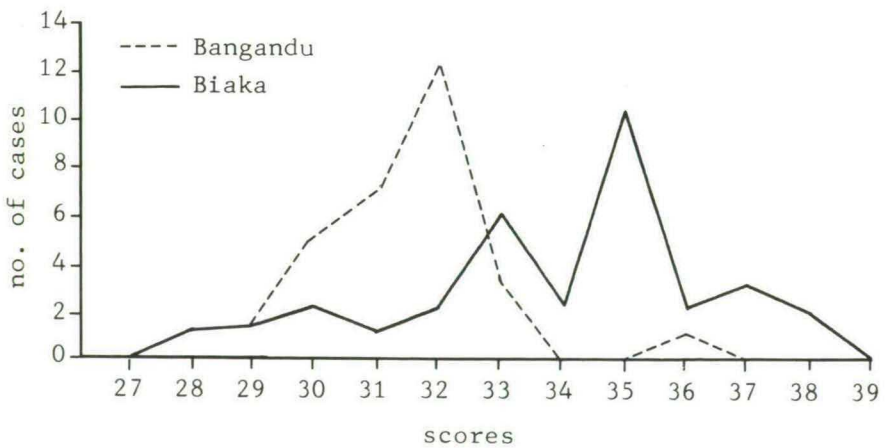
deviations see Table 6.13. For a frequency polygon see Graph 6.1.

Table 6.13 Distribution of Scores for fostering field independence based on Interviews with Neighbours

Group	N	Mean	Sd	Range
Biaka boys	18	34.06	1.43	31-37
Biaka girls	14	33.86	3.48	28-38
Bangandu boys	13	31.15	1.99	28-36
Bangandu girls	17	31.65	0.86	30-33

When comparing boys with girls within each group no difference was observed.

Graph 6.1 Frequency Polygon for scores on Independence Scale



We hypothesized that the results from the questionnaire would indicate that Biaka parents show a relative emphasis on socialization towards independence in bringing up their children. This was indeed what was found for the total group as well as for the boys separately. However, as we have seen, the difference between the Biaka and Bangandu girls was not significant.

The ranges within the groups are small. It should also be emphasized that the reliability of the scale is low, with an alpha of only .21 for all the subjects together. This makes the interpretation somewhat hazardous. When we started interviewing we were fairly confident

that the questions asked were about topics which are real issues in the sense that at least the possibility of difference of opinion is recognized in both cultures under consideration. Yet, some questions elicited either a general yes or a general no. Some other questions showed rather little variance within one of the subgroups.

There were four items (4, 7, 15 and 18) with a different content for boys and girls. We had expected that these questions would show similar means for boys and girls. However, a check on these items revealed unexpected differences in comparison with the other items. When we compared boys and girls on the remaining thirteen items we found that the scores for boys were higher than those for girls, both within the Biaka group ($p < .01$) and the Bangandu group ($p < .05$). This is contradictory to our expectation that we would find such a difference for the Bangandu only. This expectation was based on the low role diversity among the Biaka and their relatively high esteem of the women's contributions to the economy. This was expected to be reflected in the children's upbringing.

When looking at the items with the different content we found that to one question (15) the Biaka unanimously answered yes for the girls but no for the boys. Girls should be able to fetch water on their own but the boys are not yet allowed to climb palm trees at this age. The reason could well be that climbing a palm tree is closely associated with drinking palm wine which is a privilege for the somewhat older males.

Some of our expectations about the items were clearly erroneous. One question asked was: "Is ... (name of the child) already able to set a trap on his own?" All Bangandu said yes and most of the Biaka said no. This result went completely against our hypothesis that the Biaka boys are more independent. When tentatively checking some results we found that Biaka boys who are somewhat older than our subjects are perfectly capable of setting snares and traps. At the age of nine to eleven, however, they are more involved with palm rat hunting with spears, a hunting technique which is considered rather dangerous and is, in fact, unusual for Bangandu boys of the same age.

Some of the items which showed intergroup differences in the expected direction are the following.

- In the evening, when the parents are talking (3) the Biaka boys are in general allowed to speak but not the girls, some Bangandu boys can join the discussion "a little" and only one Bangandu girl was allowed to speak.
- When sent to bed, only the Bangandu girls go to bed right away (10); the other children seem more reluctant.
- When parents are talking (9) there is some choice for most of the children but all Bangandu girls, except one, simply have to listen.
- Only some boys are allowed to carry a heavy bunch of bananas (13) although generally the African girls and women often carry heavy loads.

Neither Biaka nor Bangandu seem to stress independence more for boys than for girls. We had only expected to find no such difference in the Biaka family as a consequence of the fact that in principle each person can perform any kind of work which has to be done. This would result in an equal stress on independence for boys and girls.

Summing up we have to conclude that the psychometric evidence is weak, although some significant differences were found. The mistakes in the operationalization of the socialization construct are obvious, which implies that the relevance of the scale as a test of the underlying theory is diminished.

We would like to add to the evidence the impressions which we gathered while observing, almost daily, in a non-specific and rather casual way, the ongoing behaviour of parents and children. To a certain degree the Bangandu parents seemed to stress the dependence of the children, especially while keeping them occupied with household chores. For the Biaka it seemed as if much of the behaviour the children were supposed to develop had already been learned. When observing the ongoing behaviour among the Biaka it often struck us how few indications were given or questions asked. Both boys and girls in the nine to eleven age group seemed to do just what they considered their job or were expected to do. We tend to think that it is the initiative, the taking of a certain responsibility implicit in the activity, which is important. As we said before, it is not so much the fact of the child doing a chore which makes him responsible but the fact that he can be counted on to do so.

6.4 Discussion

As we have seen in the section on the several hypotheses regarding the interaction between parent and child, the results give very little support for a firm relation between the cognitive style and the several observables. It cannot be said that a low reliability of the tests is responsible although it may have played a role for some tests and for some groups (c.f. chapter 4). The interaction aspects of the Tower Building Task do not give support for the relations we expected, neither is there support for the expectation that the Biaka children would prove to be more socialized in a way which seems to foster independence than the Bangandu children.

The factor analysis of the several Tower Building Task variables resulted in a comprehensible factor structure. When considering the relations between the three factor scores and the results of the questionnaire, the relations are not only insubstantial, but also sometimes in unexpected directions. See Tables 6.14 and 6.15 for the correlation matrices for the Bangandu and Biaka children. Only for the Biaka children is there a significant cor-

Table 6.14 Intercorrelations of four Socialization Variables for the Biaka children

Variable	T.B.T. Helping	T.B.T. Uncertainty	T.B.T. Negative Reinforcement	Questionnaire Dependence
Tower Building Task Fac. Score Helping	-	-.07	-.15	.08
Tower Building Task Fac. Score Uncertainty	21	-	.07	.20
Tower Building Task Fac. Score Neg. Reinforcement	21	21	-	.44*
Questionnaire	21	21	21	-

Notes: 1. All variables are (re)named and keyed towards Dependence.
2. Under the diagonal the number of observations is indicated.
3. * $p < .05$. one-tailed test.

Table 6.15 Intercorrelations of four Socialization Variables for the Bangandu children

Variable	T.B.T. Helping	T.B.T. Uncertainty	T.B.T. Negative Reinforcement	Questionnaire
Tower Building Task Fac. Score Helping	-	.06	.26	-.31
Tower Building Task Fac. Score Uncertainty	22	-	.00	.00
Tower Building Task Fac. Score Neg. Reinforcement	22	22	-	.02
Questionnaire	21	21	21	-

Notes: 1. All variables are (re)named and keyed towards Dependency
2. Under the diagonal the number of observations is indicated.

relation between Negative Reinforcement and Dependence i.e. being considered by neighbours as receiving a socialization towards dependence. This does not point to a solid cohesion between the variables used in this approach to the socialization of the Biaka and Bangandu children.

It should be concluded that we find very little evidence for a relation between the socialization variables and the cognitive style. Neither was it confirmed that the socialization of the Biaka children fosters field independence more than the socialization of the Bangandu children, except for one aspect, the reports of people who know a particular family well.

CHAPTER 7: ACCULTURATION

7.1 The Role of Acculturation

"Cross-cultural psychology is an attempt to comprehend systematic relationships between cultural-level variables and the behaviour of individuals" (Berry, 1980, p 157). An important variable in cross-cultural psychology is the degree of acculturation of groups, being the object of study, and of the individuals within these groups. Cultures or societies are never isolated and static systems. There is always a certain degree of interaction with other groups. The frequency and intensity of the contacts are different.

When cultural groups come into contact, this will have an impact on the groups and on the individuals constituting these groups. The patterns of both cultures will change as a result, and assimilation of elements from one culture by the other can be the outcome. The concept of acculturation is formulated in different ways, but in the broad sense as described above, it is defined and used by many authors, e.g Redfield, Linton and Herskovits (1936, p 149) "when groups of individuals having different cultures come into continuous first-hand contact, with subsequent changes in the original culture patterns of either or both groups".

In our study the pattern of the acculturation aspects is complicated. There are the groups of Biaka and Bangandu both with their contacts with neighbouring groups. There is, however, also an important second type of contact, the one with the colonializing power. Berry (1979, p 10) distinguishes four "features and dimensions" in the acculturation process: the basic nature of the phenomenon, the characteristic course it takes, the level at which it acts and the measurement aspects of the phenomenon.

Regarding the nature it seems to Berry (1979) that in practice, although there is often a dominant cultural group, complete assimilation of one group by the other is not the necessary outcome. On the contrary a variety of relationships may develop. In our study the relation between the two groups, Biaka and Bangandu, appeared to be a very complicated one. The symbiotic relationship they have is described in chapter 2. It was concluded that a high degree of mutual dependence ties them together both economically and psychologically.

In the course of the process Berry (1979) indicates a characteristic three-phase line: from contact, via conflict, to adaptation. He points out that the second phase, the one of conflict, is a possibility only. In the case of the Biaka and Bangandu, we can but guess as to the degree of conflict. With regard to the French being the colonializing power and for both groups a foreign culture, it seems to us that the conflict was more serious for the

Bangandu than for the Biaka. The reluctance on the part of the French to establish any social, religious, economic, administrative or military control over the Biaka is an indication that in fact there was very little acculturative activity from the Western world.

Regarding the level of acculturation, Berry points out that acculturation is seen as a phenomenon influencing both the individual and the group. It proved not to be possible to use this construct for both the individual and the group in our study in the same way. Berry (1976) constructed an index of acculturation in which "mean sample education", "availability of wage employment" and "degree of urbanisation" are taken into account. The Biaka, however, hardly know these three acculturative influences. Yet, we did try to assess the acculturative influences from the Western world. We chose to describe the acculturative influences on the group as a whole in the form of an historical sketch of the region which will be presented in the next part of this chapter. As far as the influences on the individuals in the groups are concerned we described two elements of acculturation as general phenomena which could be traced and operationalized. These aspects will be discussed lateron in this study.

Measurement, the fourth issue mentioned by Berry (1979), is a complicated one. When Witkin and Berry (1975, p 68) concluded that "scores on differentiation tasks show an increase in differentiation as a function of acculturative influences", acculturation was seen mainly as Western influences. The picture seemed clear at both individual level and at group level. In a later study Witkin (1977) indicated "that there is no clear Western - non-Western ordering on the field dependence-independence dimension" (p 37). It is concluded: "Just as non-Western groups show considerable diversity among themselves as a function of their standing on the ecocultural dimension, so do Western groups show diversity as a function of their social structures and socialization practices".

For our study we tried to find groups which could be ranged on this ecocultural dimension mentioned. It has been described in chapter 1 and 2 how we found and did our research with these groups. We planned to study and looked for two groups living in the same area, but with a different adaptation to the environment. However, acculturation in the case of the Biaka and the Bangandu proved not to be a clear-cut matter of the same kind of contact between the two groups and of either group with other Africans. We have the impression that contact of the Biaka with other groups goes via the "owners". It also seems that Western influences went mainly via the Bangandu. We shall try to clarify this in the next section.

7.2 A Short History of the Acculturation of the Bangandu and the Biaka

Both Bangandu and Biaka have had to cope with the forest for many generations. Besides that, they developed their unique relationship discussed in chapter 2. As described, the Bangandu are newcomers in the region. On arrival in the Lobaye area they had to find their way, not only with the Isongo but also with several other tribes. The Bangandu have kept their own identity as far as their social structure and customs are concerned, but frequent contacts with the other tribes have led to an assimilation of various components of other cultures. In most cases it is difficult to determine the origin of the various elements. For example, both Bangandu and Isongo use the same musical instrument for their ceremonies, a wooden handle with small iron bells, essential to both but with different names in the two languages. If it was adopted from one tribe by the other, whose was it initially?

The contacts with more remote groups are less frequent and less intense, yet their impact is unmistakable. Many of the Bangandu speak several languages, often Sango, the lingua franca of the Central African Republic, but also languages of other tribes with which they have had frequent contacts. In recent times this has often been the result of working together with others in a certain region, in the timber industry for example. In the past slavery played a role comparable to this kind of employment. It is difficult, if not impossible, to distinguish between contact and exchange of culture with other African populations and contacts with the Europeans. With the French the inhabitants of the Bagandu region have had contacts since 1901.

Depending on the demands of the economy some factories flourished for a certain time. World War I gave rise to a demand for rubber and at one particular time there were as many as four rubber factories operative south of the Lobaye, one of them in Bagandu. The only remains of a once active palm oil factory built in the village of Lombo in the centre of Bagandu, are a large rusty steam engine and an iron hangar in use to store coffee. The goldmine of Moboma situated south of the Bagandu to Loko road, now abandoned, was still creating labour problems with the villagers in 1954. In the centre of Bagandu a large metal roof over a concrete flooring was in use as a modest market place, especially in the dry season when the villagers had received money for their coffee. The cultivation of coffee was the most recent development in the area. It brought some cash money, needed to pay the different kinds of taxes and offered the possibility to buy some Western goods or supplementary food like peanuts and beef. Every now and then a cow was slaughtered and the meat was sold by muslim merchants who came all the way from Tchad with a small herd of cattle. We calculated, however, that by an equal dis-

tribution the average amount for every villager was only a few grams a day, not contributing much to the protein intake of the Bangandu.

It was during our field periods that the growing influence of the muslims on the village became visible when the first Bangandu to become a muslim was elected major of the Commune Rurale de Moboma, the community everybody called "Bagandu". His coming into office initiated several activities like for example the prohibition of having the small half-wild pigs roam around in the village and of the cutting of the enormous tree planted on the tomb of the father of an old and respected villager to make place for a small maternity home beside the dispensary. All these contacts and changes had a direct effect on the Bangandu, but also on the Biaka due to an increasing exploitation of the forest. The augmentation of Western objects and behavioural elements they meet when associating with the Bangandu must also take effect. It must be tantalizing for a Biaka woman to see a village woman use an aluminium cooking pot and realize that it is more effective than her own earthen pot which has to be transported in a basket from camp to camp.

A very modest Western type of 'school was founded in 1954. The number of children receiving formal schooling depended on the political and economic situation, but during the field periods many children went to school (see chapter 3). In the lower school, the "cours preparatoire" (cp1 and cp2), some of the instructions were in Sango, the lingua franca, but officially the teaching language was French. The "cours preparatoire" was followed by a "cours elementaire" (ce1 and ce2) and a "cours moyen" (cm1 and cm2). Many pupils attented the school for a couple of years only. After six years a national examination determined who would go to secondary school in M'Baiki or Bangui. The number of children leaving the village for this reason was estimated to be about five each year. It is not known how many were successful in secondary school. Some did come back to the village after some years of secondary schooling to become farmers.

Already in 1908 Loko was a military post. From here a road was constructed alongside the Lobaye river via Bagandu to Bakota between 1938 and 1939. It was only during the Second World War that a road was constructed between M'Baiki and Bagandu. Between 1959 and 1978 a metal ferry was the rather unreliable connection across the Lobaye. When it finally broke down, the old and abandoned connecting road via the Loko ferry was repaired. Bagandu is situated rather close to a provincial capital, but in spite of this it has remained rather isolated. It should be noted that in fact most of the studies involving the Biaka have been done in the much more accessible region of Mongoumba at the place where the Lobaye river joins the large Bangui river.

Near the end of the third six month's period of fieldwork, we witnessed a landmark in the acculturation history of the Biaka. The Portuguese planter who lived in the most northern village of the community started to hire Biaka to work for him. As usual in the period of harvesting the coffee crop, he was in need of labourers. Bangandu children used to help him for several weeks, mainly by picking out the wrong ones from the large amount of coffee-beans that had been gathered. As most children started going to school, there was a shortage of manpower. So he sent out a truck to pick up Biaka from camps near more remote villages to work for him. This had a far-reaching effect. These Biaka had "owners" with whom they had a special relationship. The planter's providing these Biaka with money meant influencing their economic relation with the "owner", who used to be their only source of cigarettes, salt, cooking utensils, spearpoints, knives, machetes and clothing. Having money at their disposal the Biaka became less dependent on the villagers. The relationship between the planter and the villagers was affected. It meant an interference with manpower which would probably have been used at least partly to work on the villagers' plantations. Before this happened we had only seen a Biaka in possession of money on three occasions and then only a very small sum. We never actually witnessed a Biaka being a customer in the small shop kept by the planter, but it is not unlikely that the "money economy" started at this point for those who got wages. When we, prior to this, asked the Biaka about their travel experiences as an approach to the assessment of acculturation, many of them told us that they had never visited the village of Boumbekiti where the plantation and the shop were situated.

7.3 Acculturation on the Individual Level; the Variables

Two approaches were adopted to assess the degree of acculturation for the individuals. For each subject of the Biaka and Bangandu group a so-called "biographic data form" was filled in. It had several functions. For the Biaka especially it served as a means of identification. The name of the subject was indicated, but also his parents' names, the name of the spouse, of the "owner" and of the camp. Further notes were made of the knowledge of languages, travel experience etc. In this way we were able to assign scores to subjects on several variables which seemed to be of relevance to the aspect of acculturation. It should be realized that the distributions for the two groups are sometimes rather different. There were for example only a few Biaka who had some knowledge of French while several of the Bangandu spoke it more or less

fluently, especially the schooled ones. We do think, however, that in both cases it points to assimilation of Western elements.

A distinction was made between two types of variables. The first set of eight variables was called Acculturation Contact; the second set of five was called Acculturation Test Related. By Test Related we indicate that the variable is closely connected with test performances. The task is a test or a test-like situation but the constructs on which these variables are based, are not the same as the constructs behind our cognitive style tests. We shall turn to this when we discuss each variable in turn.

The eight contact variables will be discussed first. It should be noted that formal education in school which is an important variable could not be used in this approach for the Biaka as there was virtually no Biaka with any schooling. (We did come across two Biaka children who had been to school but they had been fully adopted by the family of a nurse who was a Ngandu and lived in Mbaiki most of the time. Moreover, their ages were not in the range required for our study.) We decided to compare some sample groups of schooled and non-schooled Bangandu in a separate analysis. Also some attention will be paid to the individual level of education.

The number of local languages spoken by the subject (variable 1) seemed to be of importance. It reflects the willingness to communicate with other groups and is the result of close contacts with members of other tribes. The knowledge of French is not included here as it constitutes a second variable and neither is the knowledge of Sango, the lingua franca of the R.C.A. and, in fact, the official national language. The knowledge of French (variable 2) and of Sango (variable 3) were scored separately on a 4-point-scale. (See Table 7.1.)

Table 7.1 Knowledge of French (or Sango). Variables 2 and 3

1.	None.
2.	"A little" i.e. some understanding only.
3.	A good knowledge, passively and actively.
4.	Can read and/or write the language.

The fourth variable is ownership. This variable reflects the subject's wealth in terms of having property in the traditional sense such as knives, pottery and ornaments but also Western goods and clothing. Most Pygmies scored at the lower end of the 5-point-scale but so did several villagers and only a few villagers scored 5 indicating that they owned a bicycle or lived in a hut with a tin roof and possessed some furniture and good quality clothing. This variable called for observations of and information given by the subject. (See Table 7.2.)

Table 7.2 Ownership

1.	Low; bad or very simple hut, (almost) no Western clothing, hardly any utensils, no furniture.
2.	Simple hut, somewhat better clothing, some utensils.
3.	Better hut, some furniture or more utensils.
4.	Rather good house, sometimes some money, better household equipment and utensils.
5.	High; has bicycle, a house with tin roof, some sheep, good clothes.

The fifth variable is employment and technology. (See Table 7.3.)

Table 7.3 Employment and technology

1.	Traditional hunter or farmer.
2.	Hunter with gun (meaning being able to use it and not necessarily owning it) or farmer who also hunts with gun, is a more or less professional fisherman or has a small cash crop of coffee.
3.	Farmer who spends some time as an artisan.
4.	Wage earner, full time artisan or important cash crop.

The sixth variable is Adoption of Religion. This does not mean religion as such but refers to the willingness to adopt changes. Adoption of the Muslim religion, for example, also means that the market as an economic and social institution is accepted; that is to say, in this part of Africa does it have this meaning. This is accompanied by the necessity of the monetary system. (See Table 7.4.)

Table 7.4 Adoption of religion

1.	Animism.
2.	Some Africanized form of Christianity.
3.	Roman Catholic or Protestant.
4.	One of the Muslim and Bahai beliefs very recently introduced in this region.

The seventh variable is Adoption of Clothing, ranging from full traditional clothing to being completely clothed in Western style. (See Table 7.5.)

Table 7.5 Adoption of clothing

1.	Wears traditional clothing only.
2.	Wears traditional clothing but made of partly "Western" materials.
3.	Wears modern "African" clothes, combined with Western ones.
4.	Is clothed in modern Western clothing.

The eighth variable is Travel Experience. It reflects on a 4-point-scale how far the subject has travelled. It encompasses only travelling to the north i.e. out of the forest in the direction of the capital. Someone who has been to the capital scores highest. Travelling into the rain forest was not taken into account as it does not involve a gradual increase in contact with Westernized groups or urban areas. (See Table 7.6.)

Table 7.6 Travel experience

1.	Own village, Boumbekiti (where the plantation and shop is).
2.	Limited area, wood factory.
3.	Provincial, M'Baiki, M'Bata.
4.	Bangui (the capital) and further north.

Table 7.7 shows the intercorrelations of the Acculturation Contact Variables for all subjects. Correlations range from r = .10 to r = .79. In general the correlations are fairly high. For every individual subject the standard scores on each of the eight variables were added to one single score on a variable called Acculturation Contact. Table 7.8 shows the correlations of the Acculturation Contact Variables with scores on the cognitive style tests for all the subjects who participated. The correlations are not very high but many are significant. The Portable Rod and Frame and the Body Adjustment Test seem to be the least influenced. We shall return to this topic later in chapter 8. For the Gbanu these Contact variables could not be used being too often difficult to assess, as the researchers were much less familiar with the local situation such as ownership than they were in Bagandu. A variable like travel experience would even be useless as it would have to be defined quite differently for this area.

There are five Test Related Acculturation variables used to assess the subjects' position on a continuum ranging from least acculturated to most acculturated. We consider the relation of this and other Acculturation variables with the test performance in terms of effects of instrument variables and especially of situation variables. The unwanted variables in situation as the one described are classified by Poortinga (1971) under three headings: a. interaction between tester and testee, b. structure and form of the experimental situation in general, and c. familiarity with the type of stimuli applied and with the responding procedures. The first two problems have been discussed in the sections on the test development and testing conditions. We hope to have overcome these problems by our way of approaching people and working with them as described in chapter 4 and 5 and that we made the comparison between groups a "fair" one. Besides these efforts the third point was also approached with the five Test Related Acculturation Variables.

Table 7.7 Intercorrelations of the acculturation contact variables for all Biaka and Bangandu subjects.

	1.L.L.	2.K.F.	3.K.S.	4.O.	5.E.T.	6.A.R.	7.A.C.	8.T.E.
1. Number of Local Languages Spoken	-	.23	.49	.31	.10	.16	.46	.48
2. Knowledge of Frence	234	-	.39	.16	.33	.28	.34	.21
3. Knowledge of Sango (Lingua Franca)	232	234	-	.61	.24	.21	.70	.60
4. Ownership	235	286	235	-	.35	.24	.71	.49
5. Employment and Technology	234	284	234	287	-	.79	.34	.23
6. Adoption of Religion	203	241	203	242	242	-	.25	.19
7. Adoption of Clothing	228	293	228	270	269	288	-	.58
8. Travel Experience	226	269	270	268	268	228	253	-

Notes: 1. Under the diagonal the numbers are indicated.
2. All the correlation coefficients are significant at a 0.1% level, except r (1, 5) n.s. and r (1, 6) and r (2, 4): 1% level,one-tailed test.

The first variable reflects the number of times the introduction series of the A.E.F.T., used to make the subject familiar with the test, had to be presented. It is, of course, a more or less subjective criterion and in this case it was much more the assistant's decision than the researcher's to say at a certain moment: now he has mastered what is expected of him and can proceed with the test. (The variable is called Number of Trials Not Needed i.e. of the maximum of seven trials one single subject reached, for reasons of presentation of the signs.)

The second of these variables is the recognition of the A.E.F.T. In order to assess his comprehension of pictorial representations, each subject was asked, prior to the actual testing, to name the images. He was given credit for the total number of correct recognitions regardless of the number of guesses prior to a correct naming. Great difficulties are often reported (Hudson, 1967)

Table 7.8 Correlations of the acculturation contact variables with the cognitive style test for Biaka and Bangandu. (Kendall's Tau)

Variable	A.E.F.T. sign +	P.R.F.T. sign -	B.A.T. sign -	S.B.P.S. sign +	B.D.T.T. sign -
Local languages spoken	.20*** 230	.15 229	-.24*** 100	.27*** 168	-.31*** 164
Knowledge of French	.13** 306	.08 299	-.12 102	-.13. 191	-.15** 205
Knowledge of Sango (Lingua Franca)	.22*** 230	.22 229	-.18* 99	.33*** 167	-.37*** 164
Ownership	.07 281	.13 274	-.06 102	.29*** 192	-.33*** 206
Employment and technology	.09* 279	.09 272	-.17* 101	.14** 191	-.18*** 205
Adoption of religion	.12** 237	.06 231	-.12 93	.12* 159	-.20*** 177
Adoption of clothing	.16*** 288	.11 282	-.16* 99	.36*** 181	-.40*** 192
Travel experience	.15*** 264	.14 261	-.11 98	.28*** 180	-.26*** 197

Notes: 1. Under the correlation coefficient the number of observations is indicated.
2. (*** $p < .001$
** $p < .01$
* $p < .05$, one-tailed test.)
3. The signs give the expected direction of the correlation.

when people with very little experience with pictorial representations are confronted with images of even familiar objects. Recognition of the images presented no serious problems. There were some group differences and also individual differences. The least acculturated of the adult groups, the Biaka women, had a mean number of correct recognitions of 21.44 out of twenty-nine with a standard deviation of 4.23. This is certainly a good performance. On several occasions we noticed that Pygmies gave or tried to find the name of a species when confronted with images of trees and leaves.

The third variable is the Verbal Task. This is a timed test in which the subject is asked to enumerate

things. He is allowed one minute, described to him as 'a short time' for each of three subtasks all assessing word fluency. The three tasks were presented in random order. One task consisted of naming as many plants and animals as possible. The other was naming as many parts of the body as possible and the third was naming as many as possible of the subject's acquaintances. To check for the homogeneity of the task if the three verbal tasks would be taken as one single test, an alpha was calculated for the set of the three subtasks: naming plants and animals, bodily parts and acquaintances. The coefficient of homogeneity appeared to be fairly high: both alpha and standardized alpha = .75 (for 377 subjects). So we will talk about one single verbal task in the following sections. The task as such is easy and is expected to reflect the degree to which the subject feels free in the presence of the researcher rather than his verbal capacities.

The fourth and fifth variables are the speed and the performance on a test which is to a certain degree comparable to the A.E.F.T. The subjects were presented a test with it's element of a solution to a problem to be found quickly and presented in typical test-like format. The purpose was to make them familiar with this way of working which is normally not required in their own culture. The test was presented after the A.E.F.T. It is called the Discrimination Task and is designed to be a cognitive task with the aspects of speed and performance and measures discrimination of form and size. The stimulus is the same triangle as used in the A.E.F.T., but in this case it is not embedded in a larger image. Most of the 25 images show the triangle in an abstract context of geometrical figures of several sizes, forms and colours. Three images show the triangle against a background of blades of grass but the triangle is not embedded. As we wanted to be sure that any correlation with the A.E.F.T. would not be the consequence of a disembedding aspect of the task we asked three experts to look at the items and select the ones which seemed to be disembedding. They did not show a considerable degree of agreement.

The Discrimination Task was a relatively easy one, fourteen of the twenty-five items had a proportion of correct responses of over 80%, calculated over all 329 subjects who did the test. For the remaining eleven items we calculated the correlation between the scores on these items and the total score on the A.E.F.T. The median value of the correlation coefficients was only r = .28. As this coefficient could have been influenced by a very skewed distribution of the items of the Discrimination Task, we checked for this. The effect proved to be very minimal. So we have rather little evidence for a dependence between the Discrimination Task and the A.E.F.T. in addition to the dependence of the Acculturation variables for all five cognitive tests. The fourth variable is the speed on this test, namely the number of items solved in sixty seconds of

the total time needed. This was calculated by adding the time needed for the items solved starting with item 1 and stopping when a total time of sixty seconds was used. For each item the subject was allowed a maximum time of sixty seconds for each trial. The performance on this test (variable 5) is the total number of items which was correct within sixty seconds.

As to the reliability of the performance on the Discrimination Task it should be noted that an overall alpha of .80 was found for the 329 subjects who did this test. For the subsample the coefficients ranged from alpha = .47 for the small group of only twelve Biaka boys to alpha = .84 for the nineteen unschooled Gbanu girls. In general the coefficients for the several groups were quite satisfactory (see Table 7.9 for the coefficients).

Table 7.9 The coefficient of homogeneity (alpha) for the various groups of Biaka, Bangandu and Gbanu on the Discrimination Task

Sample	Alpha	N
Unschooled		
1. Biaka men	.74	60
2. Biaka women	.78	28
3. Biaka boys	.79	18
4. Biaka girls	.69	13
5. Bangandu men	.77	56
6. Bangandu women	.80	36
7. Bangandu boys	.47	12
8. Bangandu girls	.78	17
9. Gbanu men	.45	24
10. Gbanu girls	.84	13
Schooled		
11. Bangandu men	.82	12
12. Bangandu boys	-	-
13. Gbanu men	.64	16
14. Gbanu girls	.74	22

Table 7.10 shows the intercorrelations of the five variables. The r's range from .14 to .80 but most of them are rather low. For every individual subject the standard scores on each of the five variables were added to one single score on a new variable called Acculturation Test Related. Table 7.11 shows the several correlation coefficients of the variable Acculturation Test Related with the cognitive style tests for all subjects together. There is a correlation of r = .22 of Number of Trials not needed with the A.E.F.T. performance indicating that the subjects who did better on the test needed less introductory training. The correlation of this variable with three other tests seems, however, higher than with the A.E.F.T. in-

Table 7.10 · Intercorrelations of the Test Related Acculturation Variables for all subjects tested

Variable	Introd. A.E.F.T.	Recogn. A.E.F.T.	Verb. Test	Discr. Speed	Discr. Perf.
Introduction A.E.F.T. Number of presentations not needed	-	.45	.26	.24	.20
Recognition A.E.F.T. Number of good recognitions	288	-	.41	.18	.14
Verbal test Total Score	285	372	-	.17	.19
Discrimination Task Speed	288	381	377	-	.80
Discrimination Task Perform.	288	381	377	391	-

Notes: 1. Under the diagonal the numbers are indicated.
2. All correlation coefficients are significant on a 0.1% level, one-tailed test.

dicating a general trend of needing more effort to become familiar with the test situation as such and not an effect of a training with the test itself. Table 7.12 presents the correlation coefficients of Acculturation Test Related and the cognitive style tests for the ten subsamples separately. In table 7.13 the correlation coefficients between the variable Acculturation Contact and the cognitive style tests are presented. It should be noted that the groups of adults and children from the three cultural groups encompass both males and females. Table 7.14 shows, for the fourteen subgroups which made up the total group of subjects in our study, the means and standard deviations of the standardized scores on the two acculturation variables, Test Related and Contact.

It cannot be said that the overall picture is very clear in the sense that for particular groups or in the case of particular tests the influence on the test performance seems to be much more outstanding than for other groups or tests. We will describe in chapter 8 how we tried to discern the influence of the Acculturation Variables on the testperformances.

For those groups of subjects who received formal schooling, the mean number of years of schooling was calculated. Although the children can be expected to

Table 7.11 Correlations of the Acculturation Test Related Variables with the Cognitive Style Tests for all Biaka, Bangandu and Gbanu subjects

Variable	A.E.F.T. sign +	P.R.F.T. sign -	B.A.T. sign -	S.B.P.S. sign +	B.D.T.T. sign -
Introduction A.E.F.T. Number of Presentations not needed	.22 *** 286	.22 284	-.39*** 76	.35*** 132	-.43 ***. 121
Recognition A.E.F.T. Number of good recognitions	.25 *** 378	.13 369	-.20* 101	.42*** 190	-.52 *** 204
Verbal Test Total Score	.27*** 373	.01 364	-.30*** 99	.42 *** 190	-.26*** 199
Discrimination Task Speed	.13** 382	.05 375	.01 102	.32*** 192	-.32 *** 206
Discrimination Task Performance	.20 *** 382	.03 375	-.05 102	.40*** 192	-.45 *** 206

Notes:
1. Under the correlation coefficient the numbers are indicated.
2. (* $p < .05$
   ** $p < .01$,
   *** $p < .001$, one-tailed test.)
3. The signs give the expected direction of the correlation.

ultimatively receive more schooling than they already had had, at the moment of testing they had about the same amount as the adults. In the case of the adults the variance seems to be larger, however. The Bangandu adult men with schooling received 2.07 years of it (s.d. = 1.31), the boys had been to school for 2.20 years (s.d. = 0.41). For the Gbanu males the number of years was 2.94 (s.d. = 1.00) and for the boys 2.46 years (s.d. = 0.51).

Table 7.12 Correlations between Acculturation Test Related and Cognitive Style Tests in ten subsamples including all subjects, Biaka, Bangandu and Gbanu, both children and adults, schooled and unschooled

Test	Biaka adults	Biaka childr.	Bang. adults	Bang. childr.	Bang. ad.sch.
A.E.F.T. +	.24 **	.33 *	.53 ***	.42 *	.30
P.R.F.T. -	.02	.07 '	.10	.04	.00
B.A.T. -	.15	-.87 ***	-.03	-.41	-.18
S.B.P.S. +	.11	.18	.56 ***	.23	-.30
B.D.T.T. -	-.25 *	-.37 *	-.55 ***	.28	-.81 *

Test	Bang. ch.sch.	Gbanu ad.uns.	Gbanu ch.uns.	Gbanu ad.sch.	Gbanu ch.sch.
A.E.F.T. +	.34 *	.30	.28	.40	.18
P.R.F.T. -	-.07	-.09	-.49 *	.10	-.51
B.A.T. -	-	-	-	-	-
S.B.P.S. +	-	-	-	-	-
B.D.T.T. -	-	-	-	-	-

Notes: 1. (* $p < .05$
** $p < .01$
*** $p < .001$, one-tailed test.)
2. The signs give the expected direction of the correlation.

Table 7.13 Correlations between Acculturation Contact and Cognitive Style Tests in six subsamples (all Biaka and Bangandu subjects)

Test	Biaka adults	Biaka childr.	Bang. adults	Bang. childr.	Bang. ad.sch.	Bang. ch.sch.
A.E.F.T. +	.10	.21	.22 *	-.05	.34	.43 *
P.R.F.T. -	-.02	.10	.21	.23	.23	-.11
B.A.T. -	-.10	-.27	-.20	-.00	-.06	-
S.B.P.S. +	.04	.10	.26 *	-.10	-.24	-
B.D.T.T. -	.15	-.46 **	-.23 *	.04	.19	-

Note: 1. (* $p < .05$
** $p < .01$ one-tailed test.)
2. The signs give the expected direction of the correlation.

Table 7.14 Group Experience of Acculturation

	Acculturation Test Related Standard Score		Acculturation Contact Standard Score	
	M	SD	M	SD
Adults				
Biaka male	0.07	0.44	-0.43	0.32
female	-0.43	0.53	-0.86	0.48
Bangandu male	0.60	0.36	0.27	0.31
female	0.18	0.54	0.14	0.28
schooled male	0.94	0.41	1.07	0.44
Gbanu male	0.33	0.32	-	-
schooled male	0.57	0.37	-	-
Children				
Biaka male	-0.41	0.62	-0.71	0.19
female	-1.23	0.51	-0.84	0.15
Bangandu male	0.16	0.42	-0.03	0.29
female	0.10	0.40	-0.07	0.38
schooled male	0.13	0.46	1.23	0.16
Gbanu schooled male	0.37	0.33	-	-
unschooled female	-0.31	0.32	-	-

CHAPTER 8: BIAKA, BANGANDU AND GBANU: RESULTS OF THE ANALYSES

8.1 Testing the Hypotheses on Field Independence: Results of the Analyses.

The main hypothesis of this study was that the Biaka as a group would prove to be more field independent than the Bangandu. It was also hypothesized that the Gbanu would be more field dependent than not only the Biaka, but also the Bangandu. To test these hypotheses several tests were used. It is also this topic which will be discussed here first. After this has been done the sex differences in performance will be considered. Finally we will look at the age differences in performance and at the effects of schooling which can be discerned.

In chapter 2 we already referred to the fact that the subgroups are by no means independent samples. The adult males and females are often spouses and the children are their children. For this reason we analyzed the results of combinations of groups where it seemed to be justified. The schooled men clearly formed an independent group when compared to the men without schooling. The males and females who were married to each other were combined in one group for the comparison of cultural groups. The first reason was that the proportions of males versus females were about equal in both groups. Secondly no consistent pattern of differences in mean performance between males and females was found, (as will be discussed later on). The comparisons of group performances will be made such that a positive sign always indicates a good test performance i.e. a performance pointing to field independence: a high score on the African Embedded Figures Test and the Sophistication of Body Proportioning Scale, a low deviation of the vertical on both the Rod and Frame Test and Body Adjustment Test and few trials needed on the Block Design Training Task. We would like to stress that with the words "good" and "better" no evaluation is meant but only a reference to a field-independent performance. Both field independence and field dependence have adaptive value which is crucial in the ecological approach. If in these cases hypotheses concerning differences in performance of groups are tested and the direction of the expected differences is indicated, a one-tailed test is required and the values of t need to be positive and significant to confirm this.

We shall now discuss the results of the test of what we shall call hypothesis 1: Biaka adults are more field independent than Bangandu adults. In Tables 8.1.1 and 8.1.2 the results are given for all five cognitive style tests for all groups concerned. On the A.E.F.T. the performances for both groups of adults are very close to each other. Although there appear to be some differences

between the sexes, to be discussed later, the differences between the cultural groups seem minimal. This is confirmed by the results of the t test ($t = -.66$). The performances of both cultural groups are essentially the same. For the P.R.F.T. the results of the two groups are significantly different. As was expected, the Bangandu show larger deviations from the vertical (which means a lower test performance) than the Biaka ($t = 3.53$ $p < .01$). It should be noted that compared with the mean deviations, found in many studies, both Biaka and Bangandu perform remarkably well. We will come back to this phenomenon in chapter 11. On the B.A.T. the Biaka, all men in this case, do not show smaller deviations from the mean than the Bangandu. This is not according to our expectations, as regards the hypothesis ($t = -2.83$). For the trials needed on the B.D.T.T. the Biaka do not need less training in this task of analysis and restructuring than the Bangandu ($t = -5.83$). The sand drawings scored with the S.B.P.S. show results which do also not confirm our expectations. The drawings of the Biaka seem less sophisticated than the ones the Bangandu made ($t = -6.60$). In summary: the hypothesis is confirmed by only one test out of five, one test does not show differences at all and three tests seem to give results which are contrary to expectation.

For the children, the picture is a bit different on the A.E.F.T. The Biaka children score higher than the Bangandu children, as expected ($t = 2.20$ $p < .05$). The P.R.F.T. does not show the significant differences we expected ($t = -1.20$). On the B.A.T. the differences are not significant ($t = 1.56$) either. On the B.D.T.T. it seems that, as is the case for the adults, the Biaka children, contrary to expectations need more trials to reach our criterion of a correct response on each of the nine items ($t = -4.69$). For the S.B.P.S. the picture is that the Biaka drawings seem less sophisticated ($t = -3.40$). In summary: as for the adults only one test gives results supporting the hypothesis (but not the same one). There are two tests which do not show significant differences, and two tests which seem to indicate better performances for the Bangandu, all of which does not support the hypothesis.

There are two groups of subjects from all three samples: Biaka, Bangandu and Gbanu, which can be compared directly as to the effect of culture: the unschooled girls and the unschooled men. For these comparisons the F test was used. The effect of culture on the results on the A.E.F.T. is not significant when the performances of the girls are considered ($F = 1.18$). For the P.R.F.T. there is a significant effect of the factor culture ($F = 4.96$ $p < .001$). It seems clear that this is due to the large deviations for the Gbanu girls. The analyses on the B.D.T.T. and the S.B.P.S. involve only Biaka and Bangandu girls, and are presented here for the sake of completeness. They

confirm the findings for children, Biaka and Bangandu, in general: the differences seem to be in favour of the Bangandu girls, (for the B.D.T.T. $t = -4.54$ and for the S.B.P.S. $t = -1.88$).

The analysis of the A.E.F.T. results for the unschooled men from all three cultural groups does show a significant effect of the factor culture ($F = 2.71$ $p < .05$). It should be noted that this does not contradict the results found for the adult Biaka and Bangandu in general. It seems that the effect of both Biaka and Gbanu men scoring lower than the Bangandu men caused this significant effect of culture. The low scores of the Gbanu men sharpened the differences already found. The results for the B.D.T.T. ($F = 44.08$) and the S.B.P.S. ($F = 47.21$) are similar for the Biaka and Bangandu men separately, when compared to males and females together. On both tests the Bangandu men seem to score better!

It can be concluded that support for the hypothesis that the Biaka are more field independent than the Bangandu, is minimal. We will see, however, that the overall picture changes a little and that some new insights can be gained when the effect of acculturation is taken into account. Before this is done, however, we will first turn to the variables; sex, age and schooling.

In chapter 1 it was hypothesized that there would be a difference in field independence between the sexes only for the Bangandu. We expected in this group a better performance for the men compared to the women and a better performance for the boys compared to the girls. In Tables 8.1.1 and 8.1.2 the means and standard deviations for the several subsamples on the various tests can be compared. For the Biaka a difference between the performances of males and females on the A.E.F.T. seemed to indicate that the males scored higher ($t = 2.02$ $p < .05$ two-tailed test). The P.R.F.T. showed no differences ($t = -0.35$). The B.D.T.T. and the S.B.P.S. showed no differences either. (For the B.D.T.T. $t = 0.47$, and the S.B.P.S. $t = -0.20$.) For the Bangandu the overall picture is different. The males scored higher on the A.E.F.T. than the females as was foreseen ($t = 5.32$ $p < .001$). This is not remarkably different from the Biaka although it seems that the magnitude of the difference is more important for the Bangandu. The P.R.F.T. shows a strange effect: the females seem to have significantly smaller deviations from the vertical ($t = -2.05$); in other words they perform better than the males. To conclude, however, that the females are more field independent in general would be careless. On the B.D.T.T. the males needed fewer trials which means a better performance ($t = 3.90$ $p < .001$). The results on the S.B.P.S. confirm these findings. Again males scored higher ($t = 3.16$ $p < .01$). Although the overall pattern is far from clear, there is some support for the hypothesis that in the case of the Bangandu the

males are more field independent than the females. For the Biaka hunters-gatherers this seems not to be the case, as was expected on the basis of the low role diversity and especially their egalitarian nature. (An alternative interpretation would be that the lower level of acculturation of the females when compared to the males is responsible for the difference!)

For the children the results are strikingly different. For the Biaka children no significant difference between boys and girls, was found, confirming the hypothesis. For the Biaka the values of t are A.E.F.T. $t = 2.03$, P.R.F.T. $t = 1.76$, B.D.T.T. $t = 1.69$, S.B.P.S. $t = -0.66$. For the Bangandu the differences were also not significant which goes against our expectations. For the Bangandu the values of t are A.E.F.T. $t = -0.70$, P.R.F.T. $t = -1.37$, B.D.T.T. $t = -0.59$, S.B.P.S. $t = 0.47$.

In chapter 1 it was described how we expected the possible effects of age on the test performance to be patterned. In general adults are more field independent than children. This makes it quite reasonable to expect significant differences on the tests between the adults and the children. We suggested, however, that the pattern might be more complicated. It could well be that significant differences would be found for the Biaka only. The reason was that we thought that the development of field independence in the case of the Bangandu stopped rather early i.e. when an optimum was attained. The Biaka, in need of a larger degree of field independence, would continue the development of analysis and restructuring skills. This would result in better performances for the adults compared to the children. These expectations are not confirmed. For the Biaka males there is only one significant difference in performances. The men made more sophisticated drawings than the boys. The t-values are A.E.F.T. $t = -0.14$, P.R.F.T. $t = 1.74$, B.A.T. $t = -0.57$, B.D.T.T. $t = 0.40$, S.B.P.S. $t = 2.06$ $p < .05$. For the Biaka females there is not any significant difference. Women and girls perform on the same level. The values of t are A.E.F.T. $t = -0.20$, P.R.F.T. $t = -0.41$, B.D.T.T. $t = 2.02$, S.B.P.S. $t = 0.73$. The results for the Bangandu males are quite different, but the overall picture seems clear. The results point to important differences in performance between the men and the boys on four of the five tests employed. (The t-values are A.E.F.T. $t = 4.06$ $p < .001$, B.A.T. $t = 3.73$ $p < .001$, B.D.T.T. $t = 4.18$ $p < .001$, S.B.P.S. $t = 2.93$.) Only on the P.R.F.T. do no substantial differences between the performances of men and boys seem to be present ($t = -1.38$). These results are different from those of the Biaka.They are also different from the pattern found for the Bangandu females. On three out of four tests there seem to be no differences between the results of the women and the girls. (The values of t are A.E.F.T. $t = -0.77$, B.D.T.T. $t = -0.82$, S.B.P.S. $t = 1.54$.) On the P.R.F.T. the performances of the girls seem

better than those of the women ($t = -2.37$). It should be remembered that also on this test the Bangandu women performed better than the men. A better performance of the children seems also present when the two groups with schooling are compared, the Bangandu boys with schooling having smaller deviations from the vertical than the schooled men ($t = -2.09$). As was hypothesized, however, the men with schooling scored higher on the A.E.F.T. than the schooled boys ($t = 3.93$ $p < .001$). Comparable results are found when the Gbanu men with schooling are compared with the schooled boys. The A.E.F.T. shows higher scores for the men ($t = 3.80$ $p < .001$). On the P.R.F.T. the differences are not significant ($t = 1.57$).

There are only a few groups which can be compared to see the effect of the variable schooling on the test performances. The results of the analysis of variance on the A.E.F.T. for the schooled and unschooled Bangandu and Gbanu men show a significant difference between schooled and unschooled ($F = 4.53$ $p < .001$). For the P.R.F.T. there is no significant difference between the schooled and the unschooled ($F = -0.94$). When the Bangandu boys with schooling are compared with the unschooled, no significant differences are found, neither on the A.E.F.T. ($t = 1.09$) nor on the P.R.F.T. ($t = 0.71$). It should be concluded that the hypothesis presented in chapter 1 as to the effect of schooling in general has not been confirmed. The result of schooling: a better performance on tests of field independence, could be demonstrated for only one test and for one group. Three other comparisons between groups did not show any significant difference.

Another way of checking if the expectations concerning a positive effect of the schooling of the subjects on the test performances are confirmed, is to test the correlation coefficients for their significance. This cannot be done for the group of schooled subjects as a whole, as we tested both adults and children from two different cultural groups. There appear to be obvious differences not only in degree but also the direction of the signs for the various groups. This must lead to a seemingly simple conclusion: schooling does not necessarily mean the same for the various groups.

We will first look at the results of the Bangandu men. For the A.E.F.T. we find a correlation coefficient of $r = .30$ ($N = 21$) with the number of years of schooling. This correlation was significant on a 5 percent level. (Number of years simply meant looking at the highest level the pupil reached and then counting the minimum number of years needed to get there.) This relation in these cases a negative one was not found for the P.R.F.T. ($r = .31$, $N = 21$) and the B.A.T. ($r = .19$, $N = 15$). For the P.R.F.T. we again spotted a strange effect: it seemed as if more schooling led to a larger deviation from the vertical. For the schooled Bangandu boys the relation was more or less

Table 8.1.1. Results on the A.E.F.T., P.R.F.T. and B.A.T. for the several subgroups.

	African Embedded Figures Test			Portable Rod and Frame Test			Body Adjustment Test		
	M	Sd	N	M	Sd	N			
Unschooled									
1. Biaka Men	16.1	3.8	67	14.3	10.3	62	37.3	9.9	24
2. Biaka Women	14.6	3.2	33	13.5	11.4	33	-	-	-
3. Biaka Boys	16.2	2.3	20	20.0	16.6	21	33.8	17.0	9
4. Biaka Girls	14.8	1.9	16	12.3	6.5	16	-	-	-
5. Bangandu Men	17.4	2.7	58	22.1	13.5	57	28.7	12.7	42
6. Bangandu Women	13.7	4.0	37	16.7	9.6	35	-	-	-
7. Bangandu Boys	13.8	3.0	12	16.0	14.8	12	45.6	17.2	12
8. Bangandu Girls	14.5	2.3	17	10.9	3.6	17	-	-	-
9. Gbanu Men	16.0	3.1	24	32.2	20.3	24	-	-	-
10. Gbanu Girls	13.3	3.1	13	30.7	13.4	13	-	-	-
Schooled									
11. Bangandu Men	19.4	2.6	21	25.5	27.9	21	28.6	9.1	15
12. Bangandu Boys	15.5	4.0	26	11.8	16.5	26	-	-	-
13. Gbanu Men	19.1	1.6	16	37.6	36.8	16	-	-	-
14. Gbanu Boys	16.3	2.5	22	24.0	15.4	22	-	-	-

Notes: 1. Score on A.E.F.T. is mean number correct out of 23 items
2. Score on P.R.F.T. is mean total deviation on 8 trials.
3. Score on B.A.T. is mean total deviation on 8 trials.

Table 8.1.2. Results on the B.D.T.T. and S.B.P.S. for several subgroups.

	Sophistication of Body Proportioning Scale			Block Design Training task		
	M	Sd	N	M	Sd	N
Unschooled						
1. Biaka Men	15.3	3.9	45	17.0	6.0	54
2. Biaka Women	15.1	5.4	22	16.2	5.8	17
3. Biaka Boys	12.3	5.5	12	17.3	4.5	14
4. Biaka Girls	13.7	3.9	10	20.3	4.7	12
5. Bangandu Men	22.5	5.7	42	10.9	2.0	46
6. Bangandu Women	18.4	4.2	27	14.4	5.7	31
7. Bangandu Boys	17.1	1.1	10	13.8	2.6	11
8. Bangandu Girls	16.5	3.7	17	13.0	3.5	14
Schooled						
9. Bangandu Men	25.7	6.4	7	10.0	0.57	7

Notes: 1. Score on B.D.T.T. is the mean total number of trials taken for 9 items.
2. Score on S.B.P.S. is mean score for drawings of a male and a female (the individual score being the sum of the scores by two judges).

the same: a better performance on the A.E.F.T. correlated significantly with the years of schooling ($r = .40$, $p < .05$, $N = 25$). For the P.R.F.T. no significant correlation was found ($r = -.10$, $N = 25$). For the Gbanu men no significant correlations were found neither for the A.E.F.T. ($r = .09$, $N = 16$) nor for the P.R.F.T. ($r = .06$, $N = 16$). For the Gbanu boys with schooling ($N = 22$) no significant relations were found. For the A.E.F.T. $r = -.04$ and for the P.R.F.T. $r = -.17$. The only conclusion can be: there is very little support for the hypothesis that more schooling leads to a better performance on the tests. One positive remark can be made namely that this finding probably gives some support to our opinion that we have been more or less successfull in our efforts to make the comparisons between the cultural groups as fair as possible. Schooling, being one of the elements of westernisation or acculturation, has not worked as a variable of overwhelming importance, suppressing the effects of other variables by being the "carrier" of a large part of the variance of the test results.

8.2 The Role of Acculturation: Results of the Multiple Regression Analyses

In the preceding part of this chapter, the results of the analyses of the scores on the various tests were presented, and some conclusions were drawn. The global outcome is that there is only scarce support for the hypothesis that the Biaka Pygmies are more field-independent than the Bangandu. When the results of the Gbanu are also regarded, there seems to be only slightly more evidence that there is a continuum in the performances, with the Gbanu showing the least degree of field-independence, the Bangandu some more and the Biaka the most.

When looking at the five different tests however, there are some remarks to be made. When the results on both the A.E.F.T. and the P.R.F.T. are compared for the people who do not have any schooling, i.e. the main group of subjects in terms of size, there is a remarkable phenomenon. On these tests, and on these tests only, some results are in favour of the hypothesis on the differential degree of field-independence of the cultural groups. In other cases there are no differences at all.

For the other three tests the results are always contrary to the expectations. There is only one exception: no significant differences in performance are found for the Bangandu and Biaka boys on the B.A.T.

The A.E.F.T. was designed especially for this study. It is a test which reflects the construct on which it is based: the ability to overcome embedding of a perceptual pattern. It also proved to be rather reliable in this

cultural context. Finally the test could be presented without problems as to hesitation, shyness and unwillingness to cooperate on the part of the subjects.

The P.R.F.T. proved to be rather reliable and it did not create problems as to understanding of the task by the subjects. However, it was the test which initially seemed least adapted to the local situations. There are more observations to be made regarding this test. In the case of the Bangandu, the women showed lower deviations than the men. Besides, the girls' test performances were even better than the women's. For the schooled Bangandu subjects, where we found a better performance in the A.E.F.T. for the adults, the boys showed lower deviations from the vertical than the men. Finally, for the Gbanu with schooling, the schooled men scored higher on the A.E.F.T. than did the boys according to the expectations, but this was not the case for the P.R.F.T. where differences were not significant. One could ask if there might be some intervening variables which play a role. For the P.R.F.T. one could of course simply argue that when comparing the cultural groups the results are what could be expected. They are more or less according to the theory. However, for the schooled subjects this is not true and the one case of a group of women scoring better than the corresponding group of men is not in line with the expectations. Finally these women with the low deviations are in their turn surpassed by the girls!

Could it be that the least acculturated subjects are less influenced by the frame when trying to find the vertical? If so, it could well be that the "frame capture" (Berry e.a., in preparation), plays a smaller role for the Biaka than for the Bangandu. This also goes for the children when compared with the adults and the unschooled when compared with the schooled. We will come back to this topic later and now discuss the more general effects of acculturation on the test performances. We shall once again turn to the various sets of subgroups of which the results were discussed in the preceding section.

In order to discern if the acculturation variables Test Related and Contact could have influenced the test results, another approach was tried. In order to see if there were systematic influences of acculturation on the test scores, despite our efforts to make the tests as fair as possible, the technique of multiple regression analysis was used. The S.P.S.S. program was adopted for the calculations (Kim & Kohout, 1975).

An attempt was made to analyze the relations between the dependent variables of culture, Acculturation Test Related and Acculturation Contact. The standard regression method was used which means that all three variables were considered for their contribution to the total amount of the explained variance. Each component of the variation attributable to one of each of the specific variables is determined as if the variable is introduced into the re-

gression equation after the other variables have been controlled for. This means that the influence of Culture, which in fact means the effect of the adaptation of the specific cultural group to the ecology, can be compared to other effects. The acculturation variables, which we already called intervening variables, may have been active in hiding the differences between Biaka, Bangandu and Gbanu. This hiding or masking of a possible or maximum performance is made plausible if we can show that much of the variance of the dependent variables can be attributed to one or both of the acculturation variables and not to the fact that the persons involved belong to one of the cultural groups, be it Biaka, Bangandu or Gbanu.

Tables 8.2.1 and 8.2.2 give the results of the analyses. Table 8.2.1 encompasses the comparisons for the Biaka and Bangandu adults, both men and women and for the children, both boys and girls, all unschooled. For these groups three variables are considered successively: Acculturation Test Related, Culture and Acculturation Contact. The reason for this order is that after tentatively reviewing the results, most of the variance appeared to be attributable to Acculturation Test Related. The variable Culture appeared to be the next, while there was only a minimal proportion of the variance which could be described as the effect of acculturation contact.

For each of the groups of subjects which figured in the comparisons across cultural groups, as described in the previous section of this chapter, all the cognitive style tests are enumerated. Then for each test the proportion of the explained variance of the test scores, i.e. the dependent variable, by the independent variable Test Related, is given first. Secondly, we indicate the proportion of the explained variance of the dependent variable, the test, by the independent variable Culture, after the variable Test Related has been controlled. Finally the proportion of the variance which is explained by the independent variable Contact after the variables Test Related and Culture have both been controlled, is given.

The reason to select the hierarchical type of multiple regression analysis is the order of importance we attributed to the variables. We are interested to see what the influence of the test situation as such, with its novelty for the subjects, has been on the test results. In other words, which proportion of the variance can be explained as being due to variables working at the moment of testing and which can be described as being aspects of testing in general, without reflecting the specific concept of field independence. After the effect of the test situation on the test has been controlled for, there is the aspect of what we called culture. This is a reflection of the ecocultural differences between the groups, the effect of the subjects being Biaka pygmies, Bangandu village-dwellers or Gbanu of the savannah; each group having found its own adaptations to the environment. The third variable is

acculturation contact. It is used as a last variable because of the fact that it reflects an aspect of culture: its flexibility. A culture is not a stable entity, but subject to permanent change, partly as a result of contacts with other groups. It is this aspect which is stressed here. It should be kept in mind that inspite of this predetermined importance attached to the variables, the standard F-test we used to check the significance of effects, refers to the contribution of each variable to the total variance after both other independent variables have been introduced into the equation (Kim & Kohout, ibid.).

As was indicated in chapter 7, the acculturation variables show considerable intercorrelations and so do Culture and both acculturation variables. The patterning of the correlations of the variables mentioned with the cognitive style variables for the various groups which are represented in the comparisons, is very much the same for the various subsamples. For all groups which we compared to other groups, as for example the Biaka women or the Bangandu boys, the correlation matrices only show differences which seem to be of any importance in a few cases.

Table 8.2.2 shows the results of the comparisons of groups including Gbanu subjects. In these cases the variable Acculturation Contact could not be used for reasons mentioned before. The proportion of the explained variance of the tests by the variable Test Related is represented first. The proportion of the variance which can be attributed to the variable Culture is also given. In all these comparisons only the A.E.F.T. and P.R.F.T. were employed. In both tables it is indicated whether the contributions to the variance of the test results by the variable is significant when the F test is applied.

When considering the proportions of the variance of the several test results of the Biaka and Bangandu, men and women, boys and girls, on the several tests, a few observations can be made. It seems clear that the Sophistication of Body Proportioning Scale and the Block Design Training Task are most affected by the influence of the variable Acculturation Test Related. For both the men and women the influence of this component on the total regression is significant on a 1 % level. We saw in the preceding part of this cahpter that the Bangandu, contrary to our expectations, did not score lower on these tests. For the women a possible reason can be discerned now: the masking effect of Acculturation Test Related is considerable while the proportion of the variance which can be attributed to Culture, independent from the two other variables, is for both variables close to 1 %. For the men this is not the same. When the variable Test Related is taken into account there is still a significant contribution to the total variance by the variable Culture, on both the S.B.P.S. (on a 1 % level) and the B.D.T.T. (on a 5 % level). The explained variance for which Culture on its own is responsible, is not high but it is there and it

leaves us without an explanation why the Biaka men should score so low on these tests. The effect of Culture, it should be remembered, seems to work in the direction favouring the performances of the Bangandu! The pattern is probably a bit clearer when we look at the third variable: Acculturation Contact. This factor being responsible for 10 % of the variance, in case of the women, on the S.B.P.S. ($p < .05$) and 6 % on the B.D.T.T. (n.s.), it becomes more clear that acculturation played a main role to the detriment of the variable Culture. For the men, however, the contribution of this variable is negligible.

For the A.E.F.T. there is only one group where Acculturation Test Related played a significant role, on a 1 % level, the group of the women. The influence on the performance of the women seems to be as follows: the Biaka women who already seemed to score a bit higher than the Bangandu women, were influenced by the effect of the variable Test Related, but this nevertheless resulted in a significant effect of the variable Culture ($p < .05$). It should be noted, however, that this variable was responsible for only about 11 % of the variance.

In the case of the children, only for the boys was there a significant effect of Acculturation Test Related, notably on the B.A.T. ($p < .01$). It may be remembered that the Biaka and Bangandu boys did not differ significantly on this test. The, not significant, proportion of 33 % of the variance attributible to Culture seems to point to possible differences between the groups. Again the A.E.F.T. and P.R.F.T. seem to have been very little influenced by the Acculturation variables. The highest proportion of the explained variance for both these tests is 23 % for the A.E.F.T. in the case of the boys; but this is only 8 % in the case of the girls. It should be remembered that on this test the Biaka children scored significantly higher than the Bangandu children.

In general for all tests and groups the influence of the variable Contact is clearly lower than that of the variable Test Related. This could well mean that the overall acculturative effects of things like knowledge of languages, possessions and earnings are lower than those of the elements which are close to the test performances as such, like speed of performance and the recognition of pictorial materials.

As Table 8.2.2 shows the whole picture is somewhat different when the Gbanu subjects are also included in the comparisons. Eight comparisons on two tests could be made. (In the two cases, i.e. for the unschooled girls and for the unschooled men, that all three cultural groups were compared, dummy variables were employed in the analysis.) In five cases a significant effect of the variable Culture could be discerned. In four out of eight comparisons a significant effect of Acculturation Test Related also appeared to be present, but it is clear that the variance accounted for by this variable is less than the amount of

variance which can be ascribed to the effect of Culture. It could well be that the effect of adding the Gbanu as a separate group influenced the results. They tend more to the sedentary, agricultural side of the eco-cultural dimension described in chapter 1. In several tests their performances were low when compared to the Biaka and Bangandu. The effect of the Acculturation variable was certainly present but may have masked the optimum differences a bit less than would have been the case if only Biaka and Bangandu had been involved in the study.

Table 8.2.1 Proportions of the explained variance of the various tests for Biaka and Bangandu unschooled males, females, boys and girls by the variables Acculturation Test Related, Culture and Acculturation Contact.

Subgroups	Test	Proportion of the Variance explained by: Accult. Test Related	Culture	Accult. Contact
Biaka and Bangandu men	A.E.F.T.	.047	.006	.018
	P.R.F.T.	.013	.087	.013
	B.A.T.	.034	.078	.019
	S.B.P.S.	.268**	.140**	.001
	B.D.T.T.	.260**	109*	.013
Biaka and Bangandu women	A.E.F.T	.114**	.108*	.002
	P.R.F.T.	.037	.004	.000
	S.B.P.S.	.220**	.014	.101*
	B.D.T.T.	.203**	.007	.062
Biaka and Bangandu boys	A.E.F.T.	.000	.227	.003
	P.R.F.T.	.008	.009	.050
	B.A.T.	.150**	.333	.001
	S.B.P.S.	.271	.099	.011
	B.D.T.T.	.124	.090	.065
Biaka and Bangandu girls	A.E.F.T.	.017	.084	.004
	P.R.F.T.	.070	.025	.004
	S.B.P.S.	.142	.005	.001
	B.D.T.T.	.499	.027	.001

Note: 1. ** $p < .01$, * $p < .05$ (F test).

Table 8.2.2 Proportion of the explained variance of the A.E.F.T. and P.R.F.T. results for various groups of subjects by the variables Acculturation Test Related and Culture.

Subgroups	Test	Proportion of the Variance explained by: Acculturation Test Related	Culture
Biaka, Bangandu and Gbanu girls	A.E.F.T.	.010	.126 *
	P.R.F.T.	.002 **	.567 **
Bangandu and Gbanu boys with schooling	A.E.F.T.	.099 *	.002
	P.R.F.T.	.000	.140 *
Biaka, Bangandu and Gbanu men without schooling	A.E.F.T.	.050 **	.011
	P.R.F.T.	.006	.163 **
Bangandu and Gbanu men with and without schooling	A.E.F.T.	.133 **	.000
	P.R.F.T.	.011	.048 *

Note: 1. ** $p < .01$, * $p < .05$ (F test).

8.3 Test Performances of Parents and Children

It is not possible to make a definitive statement about the possible origins of field independence in the biological development of the individual. This is the conclusion Witkin and Goodenough (1981) arrived at after reviewing a large number of studies. A couple of years before, Huteau (1975) had established that the correlations of the test performances for fathers and daughters and for mothers and sons were rather high when compared to those of fathers and sons and mothers and daughters. A few years later, however, Witkin and Goodenough (1981) showed that the picture was much more complicated and that a highly confusing pattern of correlations was found.

If it could be demonstrated that the correlations of the test performances of the child were higher with those of the same sex parent than with those of the opposite sex parent, this would support the idea of several researchers (e.g. Bock & Kolakowski, 1973) that the spatial

visualization and disembedding abilities would be influenced by an X-linked recessive gene. Witkin and Goodenough, after reviewing many studies executed over more than a decade, could only conclude that (1981, p 74) "the findings from most of these studies do not favor the X-linkage hypothesis". They warned, however, of the fact that in some of the studies pre-adolescent children were the subjects. Two confusing factors could have played a role: the uncertainty if an effect could be expected before puberty and a possible sex role modelling effect on the development of field independence. There was only one conclusion to be drawn: "It may therefore not be possible to test the X-linkage hypothesis decisively with data on parent-child correlations" (ibid. pp 74-75).

The question seemed to be interesting enough to make comparisons between the parents and children who were subjects in our study. We did expect a positive correlation between the performances of both the same sex and the opposite sex parent and those of the children although we did not have one single explanation as both heredity and modelling could have played a role. In Table 8.3.1 the correlations are presented for the Biaka; in Table 8.3.2 the same is done for the Bangandu. When considering both correlation matrices it seems not correct to combine the groups and present the pooled data. The differences are too large. Although the numbers within the cells are low it seems justified to draw some conclusions.

For both the Biaka and the Bangandu there are nine relevant correlation coefficients (the other ones are given for the sake of completeness only). For the Biaka there is only one test which show significant correlations between the scores of parents and children, the P.R.F.T. For both the same sex parent and the opposite sex parent the correlation is high and significant on a 1 % level. For the Bangandu the correlations are low and there is not any significant one.

To summarize, the total pattern provides no support for the expectation of the performances of parents and children to be correlated. Only the performances of the Biaka parents and children show a relation in the case of the P.R.F.T. It has to be concluded that a firm and coherent set of relationships has not been found, neither for the same sex parent nor for the opposite sex parent.

Table 8.3.1. Correlations among Cognitive Style Tests of Same Sexe Parents, Opposite Sexe Parents and their Children for the Biaka.

TEST		A.E.F.T.			P.R.F.T.			B.A.T.			S.B.P.S.			B.D.T.T.		
		S.S.P.	O.S.P.	Ch.	S.S.P.	O.S.P.	Ch.	S.S.P.	O.S.P.	Ch.	S.S.P.	O.S.P.	Ch.	S.S.P.	O.S.P	Ch.
A.E.F.T.	S.S.P.	-	-.14	.18	.07	.61	.20	-.20	-.03	-.54	-.14	.33	-.01	-.51*	-.04	.04
	O.S.P.	17	-	-.22	-.09	-.13	-.09	.55	-.04	-.44	.01	-.20	-.29	.03	-.78***	.29
	ch.	30	18	-	-.12	.07	-.10	.41	-.19	-.05	.35	.13	.21	-.34	.34	-.31
P.R.F.T.	S.S.P.	31	17	31	-	.71***	.56***	-.04	-.59	.06	-.32	-.41	.09	.18	-.24	.06
	O.S.P.	16	18	18	17	-	.87***	.23	.17	.56	-.22	.28	-.29	-.35	-.16	-.38
	Ch.	31	18	35	31	17	-	-.17	.33	.02	-.54**	.21	-.29	.11	-.03	-.17
B.A.T.	S.S.P.	12	7	12	12	7	12	-	-	.02	-.20	.40	-.54	.34	-.49	-.28
	O.S.P.	8	9	8	8	8	8	-	-	-	.33	.35	-.75	-	.65	-.41
	Ch.	9	5	9	9	5	9	7	-	-	.54	-	-.70	.04	-	.35
S.B.P.S.	S.S.P.	21	13	22	22	13	21	7	7	5	-	.66	.28	-.21	.00	-.08
	O.S.P.	13	15	14	13	14	14	6	8	-	12	-	-.42	.08	.04	-.32
	Ch.	18	13	22	19	14	21	6	5	5	18	12	-	-.31	.27	-.10
B.D.T.T.	S.S.P.	19	12	20	19	11	20	11	-	8	13	9	10	-	-.07	-.03
	O.S.P.	11	12	12	12	13	11	5	6	-	12	11	11	8	-	.02
	Ch.	24	14	25	24	13	26	9	8	9	16	11	14	17	9	-

Notes: 1. Under the diagonal the number of observations is indicated.

2. * $p < .05$, ** $p < .01$, *** $p < .00$, one-tailed test.

3. B.A.T. results only for the male subjects.

4. Blanks indicate an N 5.

S.S.P. O.S.P Ch. | S.S.P. O.S.P. Ch. | S.S.P. O.S.P. Ch. | S.S.P. O.S.P. Ch. | O.S.P.

Table 8.3.2. Correlations among Cognitive Style Tests of Same Sexe Parents, Opposite Sexe Parents and their Children for the Bangandu.

TEST		A.E.F.T.			P.R.F.T.			B.A.T.			S.B.P.S.			B.D.T.T.		
		S.S.P.	O.S.P.	Ch.	S.S.P.	O.S.P.	Ch.	S.S.P.	O.S.P.	Ch.	S.S.P.	O.S.P.	Ch.	S.S.P.	O.S.P.	Ch.
A.E.F.T.	S.S.P.	-	-.22	.04	.02	-.07	-.03	-.12	-.19	-.62*	.25	-.16	-.10	-.61**	.07	-.14
	O.S.P.	23	-	.14	-.33	-.13	-.02	-.52*	-.28	.10	-.26	.33	-.10	.02	-.75	-.24
	Ch.	28	24	-	-.40*	-.10	-.15	-.08	-.15	-.34	-.11	.35	.15	.09	.01	-.61***
P.R.F.T.	S.S.P.	28	23	28	-	-.07	.24	.15	.39	.03	.20	.20	-.15	-.00	.32	.22
	O.S.P.	21	22	22	21	-	.13	-.20	-.05	-.15	-.16	.29	.14	.13	.06	.24
	Ch.	28	24	29	28	22	-	.26	-.03	.33	.42	.18	-.12	-.12	.14	.10
B.A.T.	S.S.P.	11	11	11	11	10	11	-	-	.10	.32	-.69*	-.82**	.01	.50	.09
	O.S.P.	10	10	10	10	9	10	-	-	-	.00	.15	-.69*	.76*	.14	.80**
	Ch.	11	12	12	11	11	12	11	-	-	.66	.21	-.25	.15	-.31	.54*
S.B.P.S.	S.S.P.	22	18	22	22	16	22	9	7	9	-	-.05	-.09	-.37	.37	-.04
	O.S.P.	18	19	19	18	17	19	9	7	10	14	-	-.00	-.21	-.19	-.22
	Ch.	26	22	27	26	21	27	9	9	10	20	18	-	-.09	-.08	-.24
B.D.T.T.	S.S.P.	21	17	21	21	17	21	8	7	8	19	13	20	-	-.09	.33
	O.S.P.	16	17	17	16	16	17	9	8	10	12	13	15	13	-	-.22
	Ch.	24	20	25	24	18	25	10	8	11	19	16	23	18	15	-

Notes: 1. Unter the diagonal the number of observations is indicated.
2. * $p < .05$, ** $p < .01$, *** $p < .001$, one-tailed test.
3. B.A.T. results only for the male subjects.

CHAPTER 9: SIZE CONSTANCY, A RELATED PHENOMENON?

9.1 Turnbull's Observation

Hilgard, Atkinson and Atkinson (1979) recently published the seventh edition of their well-known Introduction to Psychology. As in former editions attention is paid to the classical topic of size constancy, "As an object is moved farther away, we tend to see it as more or less unchanging in size. This is referred to as size constancy" (p 131), the authors say. To emphasize that "size constancy develops largely as the result of experience", (p 131) they refer to a study by Zeigler and Leibowitz (1957) with adults and children as subjects and to an observation by Turnbull (1961). The first example does not necessarily give evidence for the effect of experience as there are many more variables which could have played a role. The second example is discussed more elaborately. They describe how a Pygmy who was taken from the forest into open country mistook buffalo at a distance for insects and also perceived a distant boat with several men in it as a scrap of wood floating on the water. The conclusion is clear: "Just as a child's limited experience causes errors in perceptions, the Pygmy's inexperience with distance viewing created similar misperceptions" (p 132). Anecdotal evidence is not often used in textbooks. Therefore let us take a closer look at the evidence. Hilgard et al. consulted Turnbull's publication in the American Journal of Psychology (1961) under the heading of "Notes and Discussions". It struck us that Hilgard et al. state "he (the Pygmy) saw a boat with several men in it", while Turnbull speaks about the "difficulty of believing that a fishing boat a couple of miles out contained several human beings" (p 305). In an observation of a single subject, details seem to be important. The observation in this publication is clear but short. There is, however, a book by Turnbull published in the same period: The Forest People (1961). Here he gives a full account of his travels with Kenge, his Pygmy assistant. It is an interesting book and for the psychologist probably even more fascinating than his anthropological study of the Mbuti called "Wayward Servants" (1965). But let us have a closer look at the observation. Turnbull, Henri the guide and Kenge visit a national park. Among other things Kenge had been told that he would see lots of game, but should not hunt any.

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Turnbull writes: "On the plains, animals were grazing everywhere - a small herd of elephant to the left, about twenty antelopes staring curiously at us from straight ahead, and down to the right a gigantic herd of about a hundred and fifty buffalo. But Kenge did not seem to see them" (p 251). The guide pointed out the elephants, hoping to make him feel more at home. But Kenge was not impressed. He asked what good they were if we were not allowed to go and hunt them. Henri pointed out the antelopes, which had moved closer and were staring at us as curiously as ever. Kenge clapped his hands together and said that they would provide food for a whole camp for months and months. Then he saw the buffalo, still grazing lazily several miles away, far down below. He turned to me and said, "what insects are those?" (p 252)....When I told Kenge that the insects were buffalo, he roared with laughter and told me not to tell such stupid lies....The road led on down to within about half a mile of where the herd was grazing, and as we got closer, the "insects" must have seemed to get bigger and bigger....His only comment was that they were not real buffalo, and that he was not going to get out of the car again until we left the park" (p 253).

We can of course only speculate about what Kenge was really thinking at that moment. Turnbull himself was astonished and he admits (p 305) "the inability of the Bambuti to correlate size constancy and distance has never even struck me as a possibility". We wonder if Turnbull was not the victim of a Pygmy joke. In the same book stories are told of Kenge making a fool of, for example, a village chief in a very subtle way.

We would like to mention another anecdote. It is a short story told by a Biaka Pygmy from Central Africa and written down and translated by Claude Senechal (personal communication). It has a similar component as in Turnbull's story, a comparison with small insects is made. "Munzake was telling some spicy tales about the life of a Pygmy hunter: Little bottoms came to the è bóka dance yesterday, firm little bottoms. I pick up what's hottest; so hot it's burning, spoiling the tips of the axes and assegais; they too are like fire. You move, move, keep on moving....Then the woman moves, makes the movement....You say: What - the woman moves like that! Even if you're tired, you don't draw back. Once more. Pick up the penis which is on fire. What penis? It's very small. What's it like? I would say it's a nice little assegai. Of course it's not an assegai. I tell you it's a little ant."

There is one thing which strikes us. In the second story a metaphor is used and in the first example it seems to us that the same could be the case. It is impossible to refute Turnbull's interpretation as incorrect. Nevertheless, the whole story seems to us too anecdotical to serve as evidence for a relation between experience and perception. In consequence it should not be used in a book meant to introduce the student to the science of psychology.

The observation became a topic in cross-cultural psychology. Cole and Scribner (1974) devote some attention to Turnbull's observation. (They provide the book with an extension of the title to: The forest people: a study of Pygmies of the Congo; and transform "a gigantic herd of about a hundred and fifty buffalo" (Turnbull, 1961, p 251) to "some cows" (p 97).) They comment (p 97) "We have observed a similar phenomenon when a jungle-raised Kpelle child is taken at around age ten to the capital city of Monrovia, where large tanker ships can be seen far at sea from a tall hotel on a hilltop. The child, who had never seen such a view before and was not familiar with tankers commented on the bravery of men who would go out to sea in such small boats." Besides the fact that tankers far at sea are in an almost cueless visual scene which is very important for the size constancy phenomenon (Kling & Riggs, 1971) the boy did of course not know about tankers, while Kenge, Turnbull's assistant, was a hunter.

9.2 Reuning and Wortley's Evidence

Dangerous is the use of what is called a relevant observation by Reuning and Wortley, nee Winter (1973); cf. also Winter (1967). They discuss the superior performances by Bushmen on a size constancy task. It is suggested that precise distance estimation either is a faculty inherited through natural selection, or an ability developed through training in the Kalahari desert. Turnbull's observation is mentioned to support the statement about the influence of the ecology on perceptual development. This may be a somewhat superficial way of working but it is not, in itself, erroneous. The real error has already been made in our opinion on the preceding pages where the size constancy phenomenon is related positively to field dependence both empirically and theoretically.

In the study by Winter (1967) some attention is paid to the work of Gardner, Jackson and Messick (1960). Winter reports: "Intellectual abilities and cognitive controls were interrelated and in the unrotated inter-battery analysis the factor loading for field articulation on size constancy was 0.35, which tend to show a relationship." However, these loadings and that of the Size Constancy Test indicate a positive correlation between field independence and size constancy. This implies that field-independent people tend to be effective in this size constancy task. This is actually confirmed by the correlation table presented by Gardner et al. Their task was retinal matching i.e. the "score for this test is the mean diameter of the comparison figure judged "the same" in retinal size as the standard" (Gardner et al., 1960, p 87). This is not

exactly the same as the procedure usually called "object matching" and adopted by Winter (1967) and Reuning and Wortley (1978). In the latter case "The subject is asked to indicate whether the presented disc is smaller than, larger than, or the same size as the standard disc" (Reuning and Wortley, 1973, p 49). The subject has to make comparisons with the actual physical size and not with the apparent size. In the 1973 study the authors point out "Gardner, Jackson and Messick's (1960) experiment suggests a relationship between field-dependence and size constancy, so the Bushmen's superior scores could well suggest strong field-dependence" (p 50). This is not correct. The correlations Gardner et al. present are in the opposite direction. With the Embedded Figures Test the correlation is r = .36 and with the Rod and Frame Test it is r = .18. These are low values but the first is significant. A positive correlation between size constancy and field independence was also reported in a previous study by Gardner, Holzman, Klein, Linton and Spence (Gardner et al., 1959). We should add, however, that the picture is not entirely satisfactory. Out of eighteen relevant correlations, thirteen are in the direction we indicated, but only three are significant and there is one "significant" correlation in the opposite direction. There is still another possibility, although it is unlikely. It could be that the authors in their comments on the relations have changed the signs on purpose. It is not mentioned but it is not impossible, that this was done with the idea that the procedure of object matching used by them is seen as the opposite of what was done in the studies mentioned: retinal matching. However, there is no empirical evidence for this idea. It seems to us that in both cases the most important aspect is that a comparison has to be made. One cannot look at one's own retina. And the physical size has to be judged via the apparent size on the retina.

Whatever the case may be, there is no support for the suggestion that Bushmen are field dependent. But why do the authors think that this might be the case? The reason is that they had severe problems in presenting a version of the Embedded Figures Test. Comparable to the presentation of the E.F.T., in their test (designed by Poortinga) the subject is asked to find a simple figure shown at the top of a white card in a more complex second figure shown at the bottom of the same card. We have tried out this same test with Biaka and found it very difficult, if not impossible, to have them solve even the simplest items. However, we did find some reasons for these failures. The most important problem seems to be that when illiterates are asked to trace a figure they tend to get lost when the line they are following meets other lines and makes intersections. It appeared that when the A.E.F.T. with its different response format was used, they were quite able to solve the hidden figures problems.

So we see that two apparently invalid reasons led the

authors to speculate that the Bushmen are probably relatively field dependent. Nevertheless, they themselves point out that this is contradictory to the expectations already made on the grounds that the children of the Bushmen are socialized in a most permissive way. A permissive socialization is generally found to correlate positively with field independence (see chapter 6).

There are also, it seems to us, ecological reasons for believing that field independence and a high size constancy are quite compatible. When one is able to perceive an item independent of the context in which it occurs, one might also be able to select cues in a context which gives the information necessary to judge a stimulus which is present in this field. The importance of a well-developed sense of size constancy for a Bushman can easily be imagined. As regards the Biaka Pygmies one can hardly imagine how they would be able to hunt effectively with the crossbow and kill a bird like the touraco sitting high up in the top of an enormous tree without it. To be able to shoot under a certain angle, one has to make a judgment about apparent and actual size.

A study by Mundy-Castle and Nelson (1962), on Knysna forest workers gives a positive but very low correlation between the average deviation on a size constancy task and the Block Design of the Wechsler Bellevue Intelligence Test. Their procedure is as follows: the subject is asked to match in size a triangle which is movable in size to a standard one. He is asked to press a button to stop the moving triangle. The correlations of the results on this test with the results on almost all other tasks in their test battery are very low, which raised some doubts as to the reliability of the size constancy task. It should be noted that pressing a button to stop the moving triangle while paying attention to both standard and target, introduces a new element to the already complicated task.

As it seems impossible to find an answer to our question in cross-cultural research, only a further ranging search for relevant findings is indicated. Surveys of the whole range of the literature have been done by Witkin and his co-workers (1962, 1974, 1977b, 1981). In the first survey (1962) it was suggested that "People who show a high degree of constancy may be considered to be strongly influenced by a context in their perception of an item within it; they passively accede to the influence of the surrounding field; their perception is relatively global in nature" (p 52). So the authors relate field dependence to good performances on size constancy tasks. As we have just argued, this contradicts the results of Gardner and his co-workers (Gardner et al., 1959; Gardner et al., 1960). In 1977 Witkin and Goodenough had to conclude that "most studies of size constancy have shown that subjects who do well on the Embedded Figures Test are more accurate in judging retinal size than subjects who do poorly" (p 9). Two studies also mentioned in the former 1962 study are

cited as evidence for this conclusion. It is pointed out that "E.F.T. performance is not related to judgments of object size" p 9). In the most recent review (Witkin & Goodenough, 1981) it is stated that "judgments about the appearance of objects are not related to R.F.T. performance" (p 25) and a study by Linden (1976) is mentioned which reports that field-independent subjects perform better in a size constancy task which requires judgments on the properties of retinal images. Thus we may conclude that the situation is still unclear.

9.3 New Empirical Data

In our study thirty-eight adult Bangandu males and forty nine adult male Biaka Pygmies served as subjects. Our hypotheses were: first, a positive correlation will be found between size constancy and the performance on tests of field independence and, secondly, the Pygmy hunters will do better than the Bangandu farmers.

The test material consisted of a standard grey perspex disc, 39.7 cm in diameter and fourty-four other discs varying in diameter from 28.8 to 50.6 cm. Gardner et al. (1959) (1960) only had comparison discs smaller than the standard, but we added a series of twenty-two discs larger than the standard disc. The distances between subjects and discs were the same as in the two studies mentioned: 230 cm for the standard and 172 cm for the discs to be compared with it. The subject was seated on a chair, the standard disc was pinned to a tree, the background was a small plantation and, a great deal further away, the forest. After the assistant who was standing beside the subject had explained the task, the research worker showed the forty five discs one after the other and the subject told him in each case whether it was larger than, smaller than, or equal to the standard. The discs were shown in random order. The test was presented only once.

Two scores for size constancy were calculated. First the "Range of Uncertainty" which is the difference between the upper and lower shift. The upper shift is defined as the serial number of the largest disc seen as equal to or smaller than the standard. The lower shift is defined as the serial number of the smallest disc seen as equal to or larger than the standard. Secondly the "Absolute Difference from the Standard" which is defined as the absolute value of the difference between the standard disc and the Point of Subjective Equality. This Point of Subjective Equality was computed by adding the lower shift and the upper shift and dividing the sum by two.

We related the performance on the size constancy task to the five measurements of field independence. The correlation of these tests with the size constancy variables are presented in Table 9.1.

Table 9.1 Product-moment correlations between two size constancy variables and five tests of field independence.

	PRFT	AEFT	BDTT	SBPP	BAT
Biaka N = 49					
Size Constancy	.04	.37**	.22	.29*	.40*
Range of Uncertainty	(45)	(49)	(44)	(39)	(18)
Size Constancy	.19	.34**	.39**	.01	.01
Absolute Difference from Standard	(45)	(49)	(44)	(39)	(18)
Bangandu N = 38					
Size Constancy	.03	.24	.18	.16	.10
Range of Uncertainty	(38)	(38)	(36)	(28)	(30)
Size Constancy	-.23	.07	.23	.13	.19
Absolute Difference from Standard	(38)	(38)	(36)	(28)	(30)

Notes: 1. Scores are keyed so that all test results point to field independence.
2. * $p < .05$
** $p < .01$, one-tailed test.
3. Under the coefficients the N is indicated.

For the suggestion of Reuning and Wortley (1973), that size constancy and field independence are negatively correlated, no support was found. Only one of the twenty correlations in the table was negative and not even significant.

Regarding the first hypothesis: Five of the coefficients are significantly positive. This indicates that people who perform well on the size constancy task tend to be field independent. However, the correlations on average are low. This can only partly be attributed to a low reliability of the consisting variables. A reliability coefficient computed over the even versus the uneven numbered discs yielded a value of r = .66 for the Range of Uncertainty, r = .67 for the Absolute Difference from the Standard and r = .76 for the Point of Subjective Equality.

Both Pygmies (m = 23.71; s.d. = 3.72) and Bangandu (m = 23.55; s.d. = 2.21) show a slight tendency to underconstancy, which amounts to overestimating the size of the standard disc. The difference between the two groups is not significant. This finding of underconstancy is consistent with the results of Mundy-Castle and Nelson (1962) and those of Winter (1967) for groups of illiterate subjects.

As to the second hypothesis we find a difference in performance between Pygmies and Bangandu on one variable. On the Absolute Difference from Standard the Bangandu farmers do significantly better (two-tailed test). For the

Absolute Difference from Standard variable t = 3.87 ($p < .001$); mean of Pygmies = 3.12, mean of Bangandu 1.58). For the Range of Uncertainty t = 1.15 (n.s.; mean of Pygmies = 11.18, mean of Bangandu = 9.95). So the Pygmies' performance was not superior, contrary to our expectations! Their performance was well below that of the Bangandu.

We have to conclude that our problem has not been solved yet and so it is still possible after all that Turnbull was not the victim of a Pygmy joke!

CHAPTER 10: SOME ASPECTS OF THE PHYSICAL DEVELOPMENT OF THE BIAKA

10.1 The Small People

The word pygmy is almost synonymous with small. Their smallness is indeed the most obvious physical characteristic. The pygmies are not one single group; there are several groups of pygmies living in various parts of Africa. The vast majority live in the tropical rain forest like the Mbuti, or at least near wooded areas in the savannah region, like the scattered groups of Batwa in the Republic of Zaire. When they sedentarise and come more and more in contact with other groups of much taller Africans, the first effect, at least the most obvious to the visitor, is the gain of height these people show. It is not certain which mechanisms play a role. Protein intake can be a factor when the mean size of individuals in a cultural group becomes larger. This mechanism seems to have played a role with the Japanese who grew considerably taller after the Second World War. A low protein intake is held responsible for the "pygmoid build" (p 248) of the New Guinea highland people studied by Gajdusek (Gajdusek, 1970, cit. by Gollin, 1981). Nevertheless, the Biaka seem to have a much higher protein intake than the neighbouring Bangandu and Isongo who are much taller. The Batwa whom we visited ourselves (although only one group and only for a short period) did not give the impression of being smaller than the neighbouring groups on the savannah with which they had a rather low protein diet in common. Among these Batwa even kwashiorkor was not uncommon (Van der Veer, personal communication). Regarding the forest life of the pygmies it has been suggested by Cavalli-Sforza (1971) that the "possibility of direct effect on stature should not be entirely eliminated" (p 83). He points to the fact that the relative darkness of the forest could probably be partly responsible for the lighter skin colour of Pygmies compared to other Africans. He also refers to the remarkable phenomenon that many large forest animals are smaller than closely related varieties or species living in the savannah. Biaka have somewhat different physical features than the surrounding groups like, for example, the low limb to body ratio. The most striking thing, however, to the visitor remains the apparently small bodily size.

Mann, Roels, Price and Merrill (1962) pointed to the possibility of an early cessation of growth in the case of pygmies. The ages, however, had to be estimated. Hiernaux, (1970) when discussing their study, was not convinced by their indicating a causal link between stature and differences in duration of growth. This was due to the methodological weakness mentioned and to the fact that this suggestion of a causal relation was the only one at that

time in already a number of studies on growth of Africans. A study of growth curves seems to be one of the first things to be done in this situation.

10.2 Methods and Results

Growth curves of Biaka are difficult to obtain due to their migratory customs which make it difficult to follow the same individuals over a sufficiently long period. A study by cross-sectional data is not much easier because the Biaka are not concerned about their age. During our periods in the Bangandu area we found the ages of quite a few people, especially children but also young adults. These pygmies were measured for height and weight. (Part of the data were collected by B.S. Hewlett in a later field period. A separate study is in preparation under joint authorship.) In the same way as described in chapter 3 on Sampling, we made up a file containing information on several hundreds of subjects. This file (and when possible also the scales and measuring rod) was taken along each time a camp of the Biaka was visited and sometimes even consulted when meeting people on a trail. Nevertheless, many Biaka we never met.

The results presented here were derived from three hundred and eight Biaka measured once and thirty-four measured twice. Ninety Bangandu and Isongo were measured once. Two hundred and eighty-nine Biaka were weighed once, and thirty-four weighed twice. Subjects were measured when standing up with their chin slightly raised and small babies who could not yet stand up even when supported were measured when lying down and stretched out.

The information collected with respect to the relationship between stature and age is shown in Graph 10.1 and Graph 10.2 for Biaka males and Biaka females respectively. All adults whose ages were unknown were assigned the age of thirty-six years and six months for the purpose of these graphs and subsequent analyses. This is arbitrary but we included only subjects who were, according to their life history, most probably over twenty-three and left out the very old who were no more able to hunt. Given the fact that usually there were more rather young men in a camp than older ones, thirty-six years and a half seemed a good guess of the mean adult age.

A graph of height versus age was fitted with a negative exponential function $s = a + b (1 - e - kt)$, where s = stature and t = age in months, across the whole age range. See Table 10.1 for the values of a, b and k for the several groups of subjects. Only the first measurement was

employed for these curves in the case of people measured twice. Our data on individual velocities were not sufficient to generate a distribution for these people. It should be noted that there is a considerable individual variation, especially around what seems to be the age of puberty. This could at least partly be ascribed to the individual differences in growth spurt if this spurt is present, which is not certain.

These rather large individual differences also seem to be present in our (very limited) data on the start of menstruation. We have information on thirty-six girls. The ages of the girls who were menstruating already ranged from one hundred and thirty nine months to two hundred and eighty five months. The ages of the girls who were not yet menstruating, ranged from one hundred and twenty seven months to one hundred and ninety three months. This means that there is a difference of more than four years between the earliest and the last girl to menstruate. See Graph 10.3 for the individual data. If one takes one hundred and sixty six months, being the middle of the range from one hundred and thirty nine to one hundred and ninety three months, as an estimate of the mean age of menarche one comes very close to the 12.8 years reported for girls in the United States (e.g. Zacharias, Rand & Wurtman, 1976).

Graphs 10.4 and 10.5 give curves regarding height for the Biaka, like the ones in Graph 10.1 and 10.2, as well as the same curves obtained for people from the Bagandu area belonging to the Bangandu and Isongo tribes. For all four curves the explained variance is over ninety-nine percent. It appears that the curves are almost identical until puberty. The differences between pygmies and others are most apparent in the height attained by adults.

It should be noted that Isongo or Bangandu men sometimes marry Biaka women who then become sedentary and stay in the village (Cavalli Sforza, 1971). We never met any of these women. However, we knew a few Biaka men that married village women and settled in a village. The village of Lago at the outskirts of Bagandu, was said to be a place where Biaka men resided, usually after having married a village widow or a woman who had left her husband. The offspring is considered Isongo or Bangandu. There is not any evidence for a movement from the village to the forest. Sexual relationships between Biaka women and villagers seem hardly to exist. An indication is the fact that gonorrhoea, which is endemic in the villages, hardly exists among the Biaka. Over a period of three years practically the only possibility for the Biaka to get medical assistance was from the research members of the Central African Differentiation project or from some other researchers they communicated with. Yet on only one occasion was help asked for a venereal disease by a Biaka man. The reason was given: his wife had had intercourse once with a villager.

The data are of course limited, but it is interesting to look at the individuals measured more than once. Graph

10.6 shows the differences in height for twenty-three male pygmies. The similarity in overall pattern with Graph 10.6 is unmistakable and especially in the age range of ten to twelve the progress is remarkably smooth. There are two outstanding cases, one of which is a relatively old person. (This male Biaka was probably ill at the time of the first measurement. When measured thirty-two months later, he was of about average height but was still remarkably skinny.) There seems to be a very gradual increase in height until a final, rather low stature is attained. Graph 10.7, although for only eight female subjects, confirms this impression.

In Graphs 10.8 and 10.9 the data from Graphs 10.6 and 10.7 are approached in another way. On the horizontal axis the age at the first measurement is indicated. The vertical axis gives the growth in mm. between the first and the last measurement, divided by the number of months between them for males (Graph 10.8) and females (Graph 10.9) separately. Especially among males there are some cases pointing to a growth spurt between ten and twelve years of age. However, for both sexes the whole picture is not incompatible with the one suggested by the form of the curves of Graphs 10.1 and 10.2: a quick growth from birth to a time which might correspond to puberty, as indicated by other marks of physical growth, and then a gradual levelling off, but eventually resulting in an adult height which is remarkably low compared with other Africans.

The impression that pygmy children are no smaller than children of other groups becomes stronger when we compare the height of three year olds from thirty-six other groups given by Meredith (1968). The shortest children are the Mayan at 81.1 cm.; the tallest are U.S. white children at 94.7. The Pygmy children (N = 16) would have ranked eighteenth at 89.5 cm.

Similar results are obtained when the average weight of the four year olds (N = 8) (14.3 kg) is compared with that of eighty-nine samples provided by Meredith (1968) in a previous study. The pygmies are again in the middle of the range, which extends from 11.1 to 17.3 kg.

In 1959 Jans published a study of the weight of Mbuti babies. It was the first study in which enough data for any pygmy group were gathered to make the presentation of mean values possible. Up to the age of twelve months the data presented were uniquely longitudinal. After twelve months the weights are obtained only partly in this way and partly cross-sectionally from babies whose births were recorded in the local administration. In Graph 10.10 our results are presented by means of the best fitting line of boys and girls separately from the age of birth to thirty months. Jans' observations are also presented. In this case each dot represents the mean of a number of observations, ranging from forty at birth to fourteen at the age of thirty months.

It appears that the results of Jans' study and our data look very much the same although the Mbuti babies apparently have a higher weight than the Biaka babies. When comparing his findings for the Mbuti with data from neighbouring Bantu groups Jans (1959, p 855) pointed already to the remarkable parallelism of their development "la difference entre les nourissons des deux groupes est beaucoup plus petite que celle qui existe entre les adults respectifs".

We would like to draw attention to the results of the earlier study on the growth curves on height and weight (among many other measurements) of the Mbuti of the Ituri forest (Mann, Roels, Price & Merrill, 1962) executed in 1960. As mentioned before the method of estimating the ages is doubtful. "The Pygmies were registered by the linguist who spoke the local Swahili dialect (O.A.R.) [Oswald A. Roels], and with the advice of an attending Bantu subchief and dispensary aid, he estimated the ages" (p 343). Nevertheless the conclusions are very interesting. Comparisons are made with samples of Canadian and U.S. subjects. When comparing with the Canadian subjects of Pett and Ogilvie (1957) it is concluded: "A notable aspect of the height curves of the Pygmy population is the earlier plateau or cresting of the Pygmy children. This occurred at about fifteen years for Pygmy boys and at about twelve years for Pygmy girls. The figures illustrate that an important part of the height differential of the two populations resulted from growth after these ages in the white people." (p 346). This pattern was reported to be confirmed by the U.S. data of Vickers and Stuart (1943). "These figures emphasize again the parallel behavior until about age thirteen for Pygmy boys and about age eleven for girls." (p 346).

A similar observation is made for weight: "The disparity to age is again small and constant. After age twelve, the Pygmy people are much lighter and the women especially show a trend toward thinning in contrast to the fattening after age twenty-five in the Canadian women." (p 346). In fact these findings are the same as our findings for the Biaka.

The relationships found between weight and age are shown in Graph 10.11 and Graph 10.12 for the Biaka males and females respectively. The observations of the individuals as well as the best fitting lines for the total groups of males and females are represented. The fitting was done in the same way as described for height, in the previous part of this chapter. (See also Table 10.1.)

For the purpose of comparison in these graphs the mean weights for the children of the Nijmegen growth study are also represented (Roede, 1979). These data are the result of a mixed-longitudinal study including over three hundred Dutch children, which was done during the years 1971 to 1973. The dots in the graphs represent the mean values at half-yearly intervals, for children between four and four-

teen years of age. It was obvious already that the adult Biaka have a low weight when compared to Europeans. It now seems clear, however, that the differences for the children are very small. It is at about ten years of age that the Biaka start to level off compared to the Dutch children. Their increase in weight continues but only very gradually. The Dutch children show a quick growth spurt at puberty. The fourteen year old boys have about the same weight as adult Biaka men, while the Dutch girls seem to be already heavier at fourteen than the adult Biaka women.

Table 10.1 Values of the coefficients a, b and k, used for the calculations of the graphs of height and weight for the several subgroups

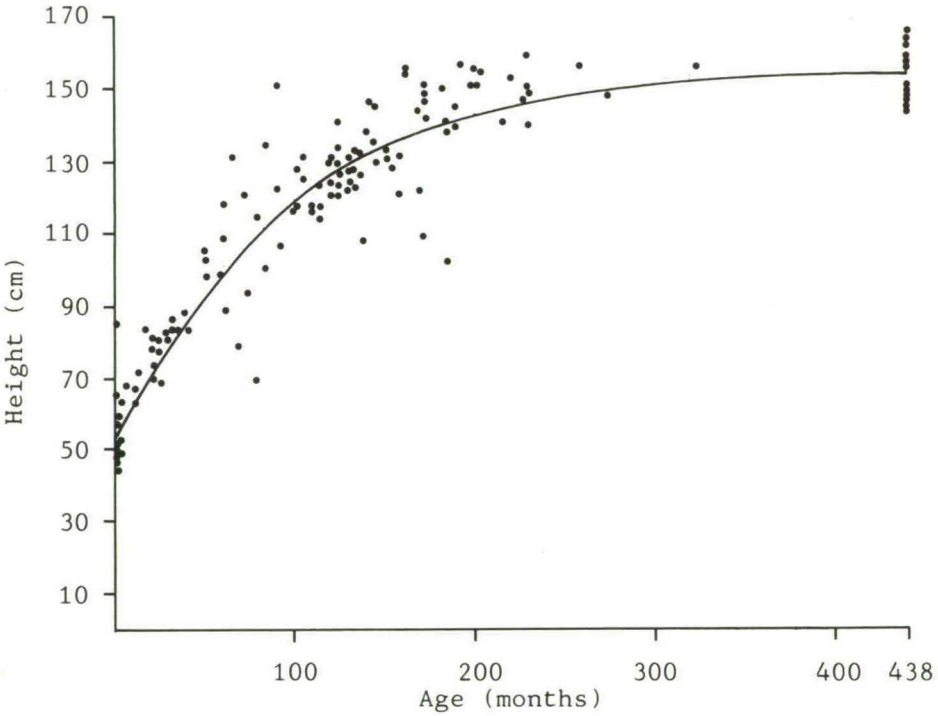
			a	b	k
Biaka	males	height	533.851	1015.84	0.0105832
		weight	3.03732	53.4826	0.00497048
	females	height	519.159	960.196	0.012135
		weight	3.62276	44.6719	0.00554302
Bangandu	males	height	455.891	1245.08	0.00981376
		weight	- 7.08422	76.5819	0.00533547
	females	height	540.637	1075.10	0.00948762
		weight	2.31182	125.662	0.00174683

10.3 Conclusion

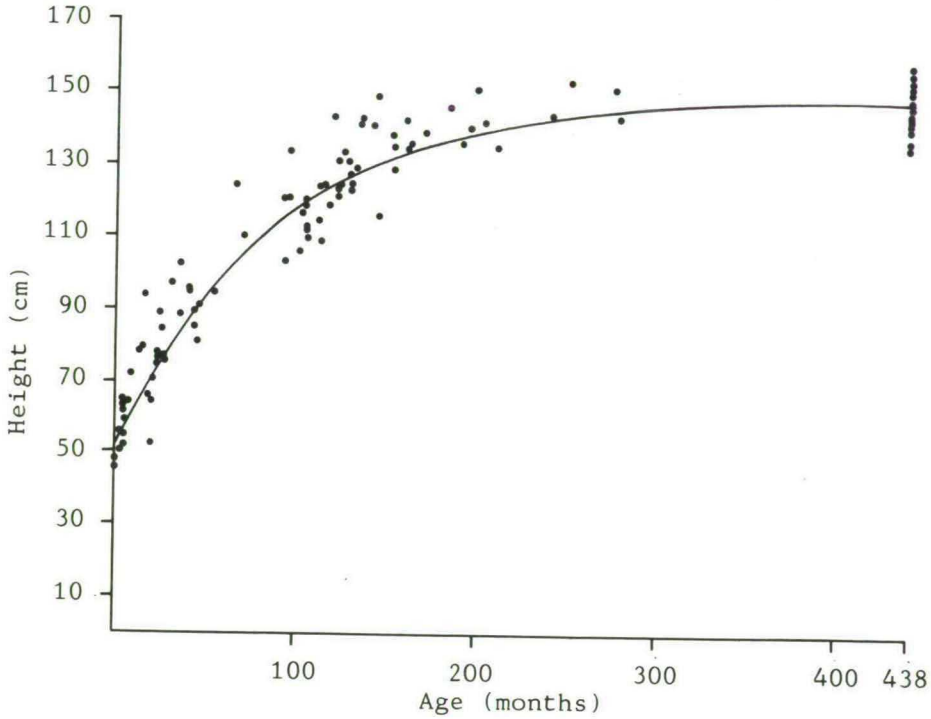
Apparently there is only one obvious conclusion. The Biaka pygmies are not the small people they are usually thought to be, but they stay small at an age when other children continue to grow.

We can only speculate on an explanation for the growth curves of the Biaka and especially on what seems to be a levelling off at a certain age. The finding of a low level of Insulin-like growth factor I for a sample of pygmies from the Central African Republic (Merimee, Zapf & Froesch, 1981) can probably provide an explanation. Before more definite conclusions can be drawn about the patterns of growth of these people more solid longitudinal data will have to be gathered.

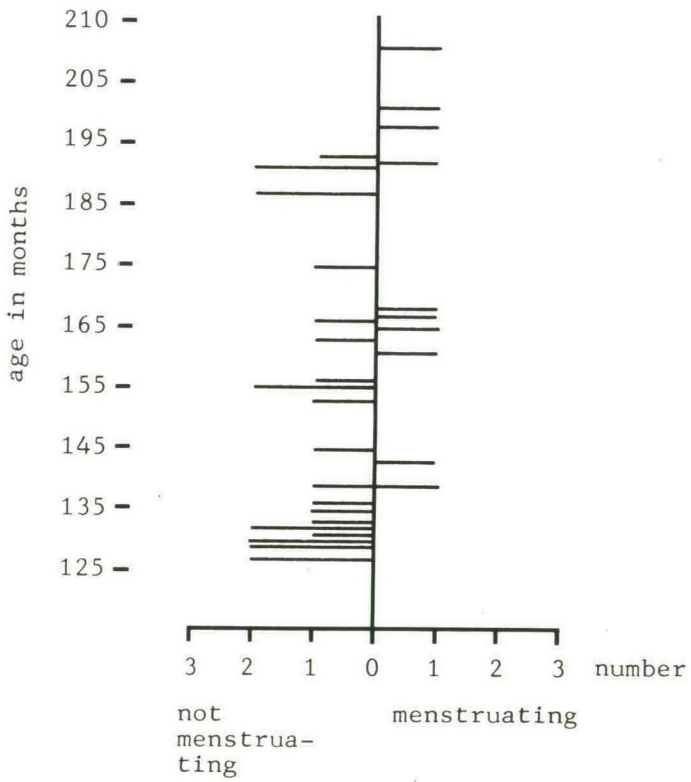
Graph 10.1. Plot of individual statures against age for male Biaka (N = 180) with bestfitting growth curve.



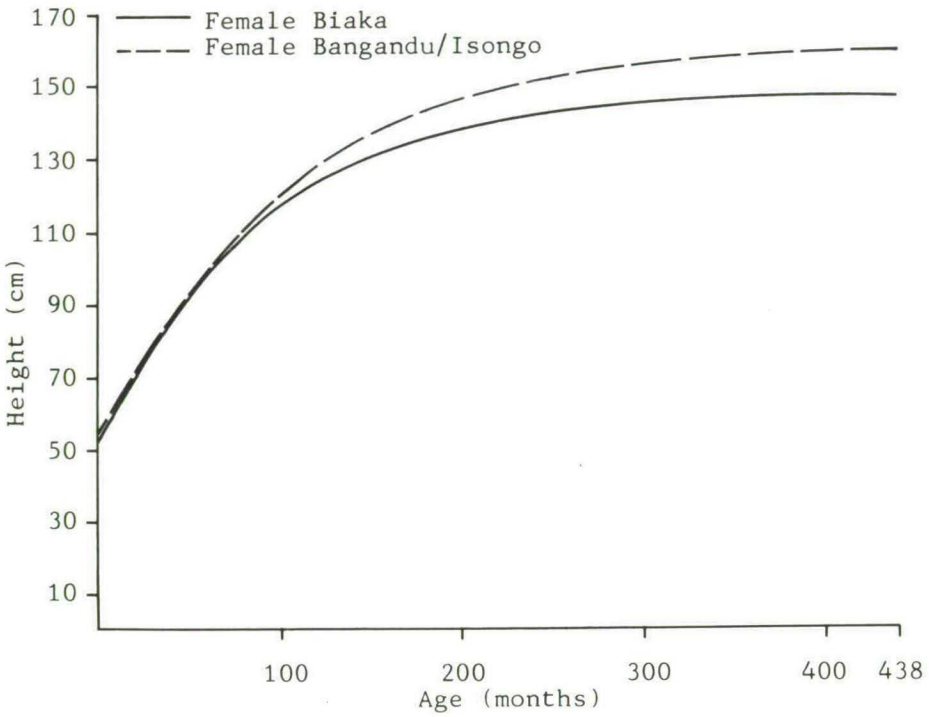
Graph 10.2. Plot of individual statures against age for female Biaka (N = 162) with bestfitting growth curve.



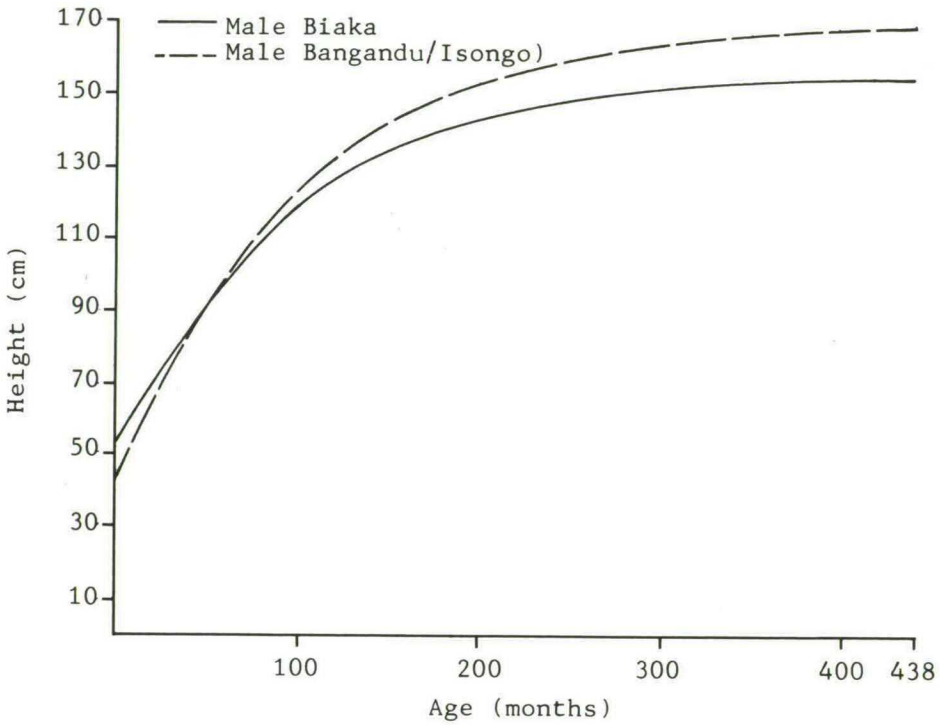
Graph 10.3 Observations on 36 Biaka girls about menarche



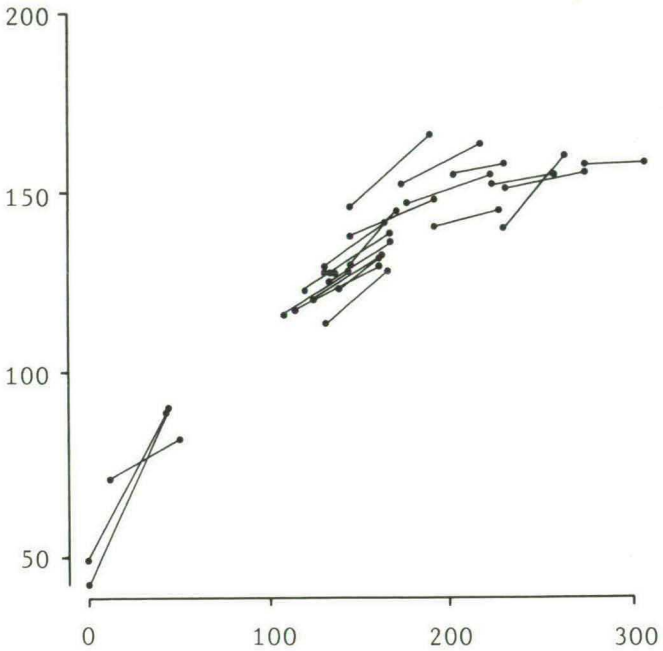
Graph 10.4. Best fitting growth curves for female Biaka (N = 162) and Bangandu/Isongo (N = 31) of the same region.



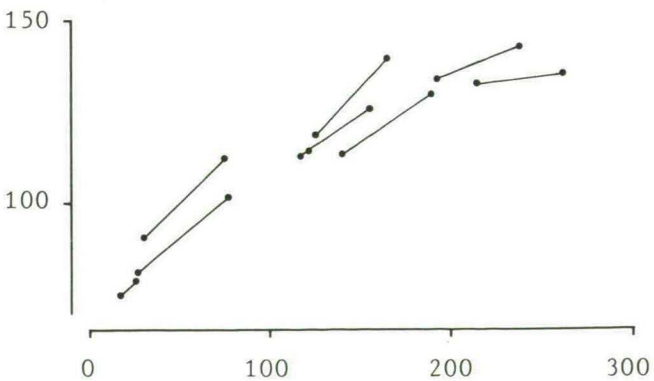
Graph 10.5. Best fitting growth curves for male Biaka (N = 180) and Bangandu/Isongo (N = 59) of the same region.



Graph 10.6. Height of 23 male Biaka at two different ages.



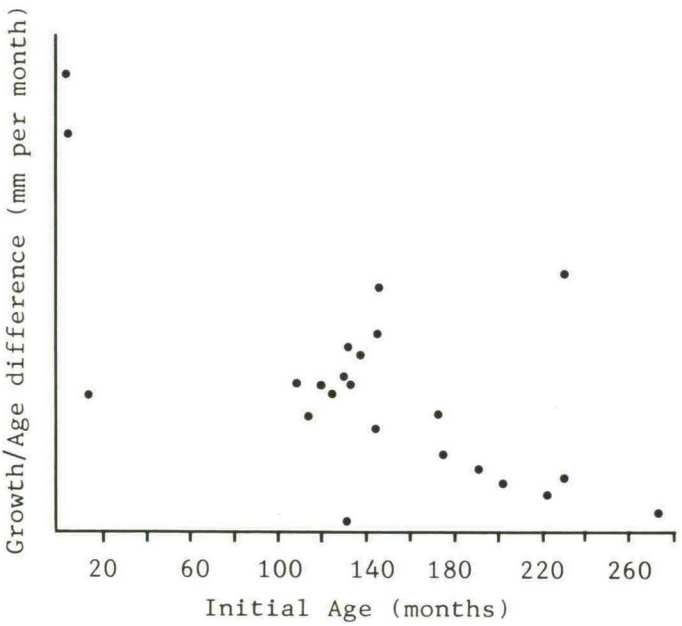
Graph 10.7. Height of 8 female Biaka at two different ages.



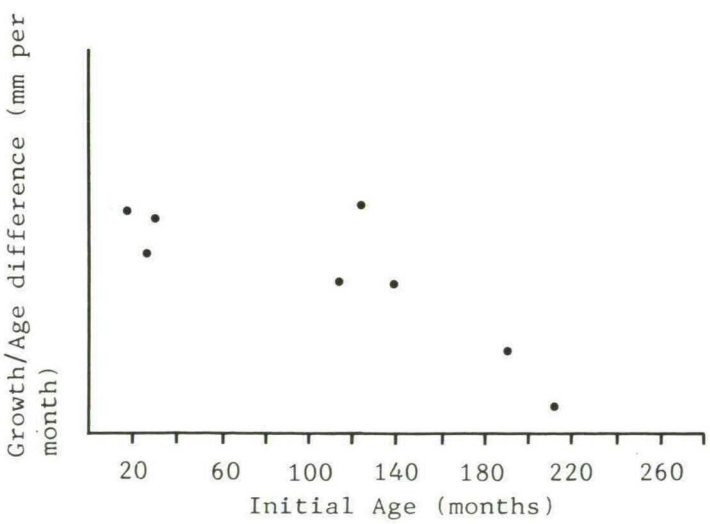
Notes: 1. One male and one female were measured three times.

2. One male and two females with unknown exact ages are left out.

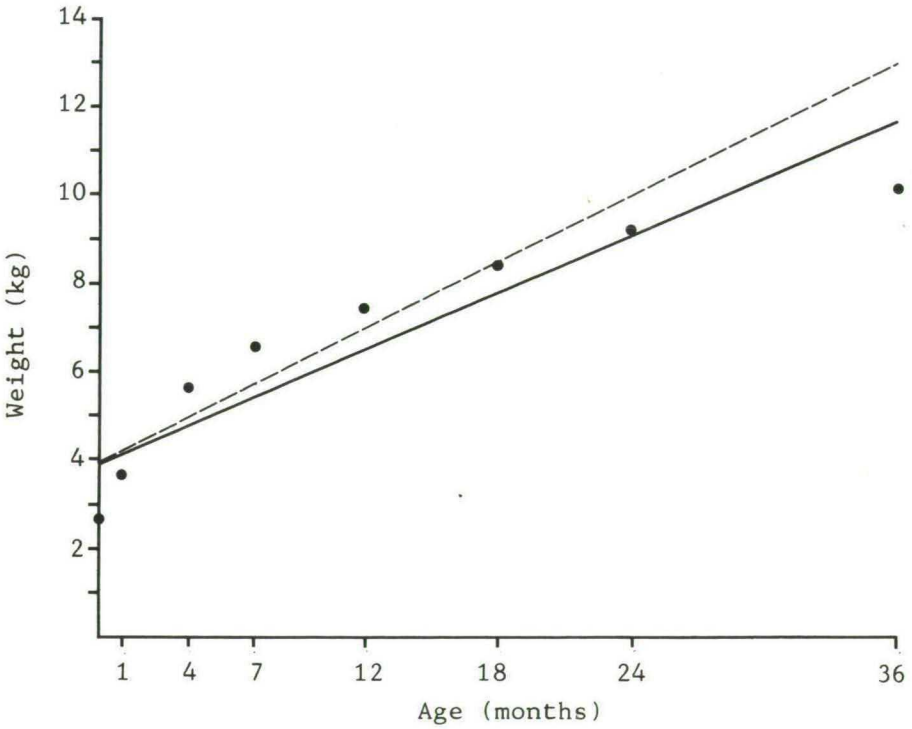
Graph 10.8 The individual growth rate for 23 male pygmies.



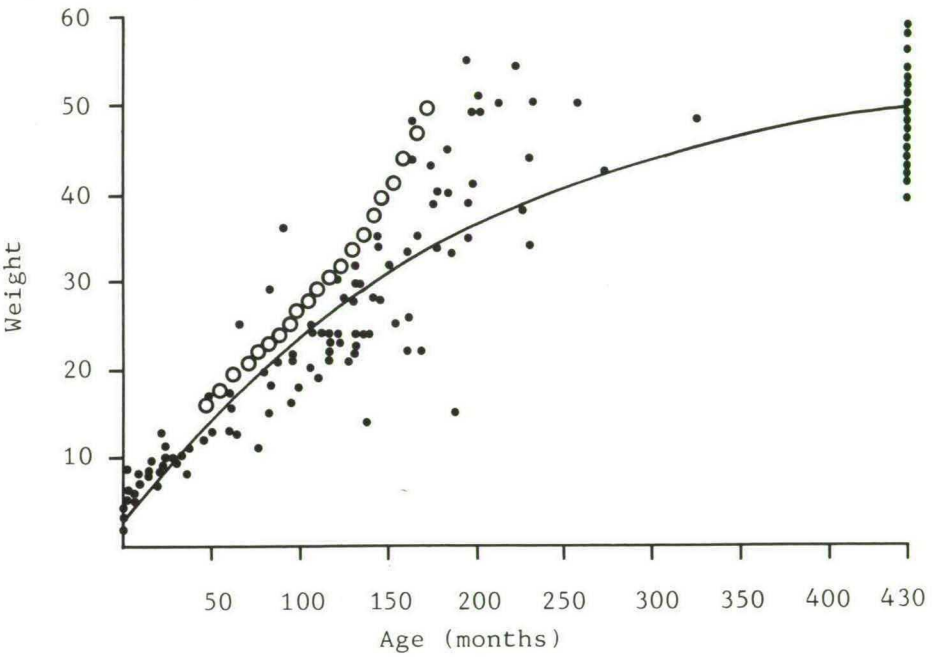
Graph 10.9 The individual growth rate for 8 female pygmies.



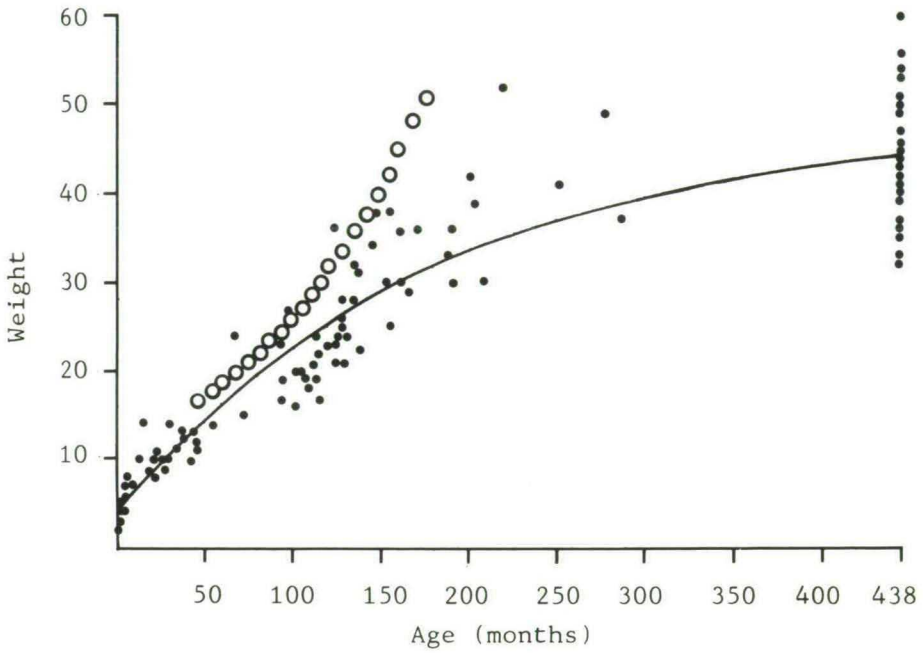
Graph 10.10 Estimated weights of male, N = 46, (solid line) and female, N = 34, (broken line) Biaka children compared with Jans' (1959) observations on Mbuti children, being the means of actual weights (dots).



Graph 10.11. Plot of individual weights against age for male Biaka (N = 175) with bestfitting weight curve. The open dots represent the mean weights from the Nymegen growth study (Roede, 1979).



Graph 10.12. Plot of the individual weights against age for female Biaka (N = 157) with bestfitting weight curve. The open dots represent the mean weights from the Nymegen growth study (Roede, 1979).



CHAPTER 11: DISCUSSION

11.1 Conclusions

The project of which the present study forms a part was initiated by the late H.A. Witkin in the early seventies. The project was called the Central African Differentiation Project, and a team of researchers from various disciplines was involved (cf. Berry et al., in preparation). The main objectives were described by Van de Koppel (1977). The Psychological Differentiation Theory of Witkin (Witkin et al., 1962, 1974) formed the framework of a comparative study in which we wished to compare two groups who live in the same environment, but adapted to it differently. In several earlier studies a manifestation of psychological differentiation, namely the cognitive style of field independence, was shown to be related to ecological adaptation. For example the work of Berry (1966) has indicated that there are differences in differentiation between the African Temne agriculturalists and the Eskimo hunters. The Eskimo proved to be relatively field independent when tested with tasks which required a search of the visual context for elements which are hidden in meaningful larger perceptual wholes or Gestalts. These elements can be disembedded and restructured to separate smaller substructures.

An important problem remained. In the cross-cultural studies already carried out, only some socio-cultural and ecological variables could be kept constant while others could not be controlled. Consequently, certain alternative explanations could not be ruled out. To deepen the understanding of the determinants of the perceptual differences which had been found, we searched for groups living in the same geographical area, but coping with that environment in a different way.

From the at that time scarce information on the peoples living in and near the rainforest of the Southern part of the Central African Republic and the Northern part of the Peoples' Republic of Congo, we understood that the Biaka pygmies and the Bangandu would meet our needs. The Biaka, we assumed, were hunters-gatherers depending on the forest ecology for their subsistence. The Bangandu, about whom hardly anything could be found in the literature and whose language was still undocumented, were farmers. It was known that they had a specific relationship with the Biaka, who worked for them on the fields in return for goods.

Not only the fact that the Biaka are semi-nomadic hunters-gatherers had raised our interest. It was assumed that the Biaka would form an egalitarian society where all people have roles which are of equal importance for the survival of the nuclear social group, the camp. It was

thought that the Bangandu would show the hierarchical social ordering typical for the cultural groups living in that part of Africa.

It became clear that the Bangandu, so near the forest in a region with a long rainy season, differed considerably from, for example, Berry's (1966) Temne subjects, who only harvest a single crop every year. The consequent high food accumulation requires a large investment of labour and strict social discipline. This has been shown to be an important influence on the development of field dependence, a hierarchical ordering of the society and socialisation towards obedience. However, the Bangandu do not only have an additional food supply from forest products like meat through the Biaka, but they even hunt themselves. The Gbanu farmers, a group living more to the north in the savannah were chosen as a comparison group. Chapter 3 describes how we selected our samples. Despite our efforts to form random representative samples, some criteria could not be met. The Bangandu children, who had to be between nine and eleven years old, were all children who did not go to school. The adult males and females are their parents. A group of adult Bangandu males and females who were selected with a random procedure was added. The schooled subjects are randomly sampled from those who were currently going to school. The Biaka sample is formed by those children whose ages could be discovered, and their parents. This is not a random procedure although we do not think that any bias in our data can have been the result. The other adult Biaka were those who were present in the region. The Gbanu subjects were randomly selected from those living in a few small villages.

Considerable effort was invested in making the tests and test procedures as fair as possible. Special instruments were constructed to avoid unwanted variables like differences in familiarity with the test items. The test construction and the field work were described in chapters 4 and 5.

Despite the efforts to make comparisons between the samples from the three groups as valid as possible, the expected differences were in general not found. Hardly any support for an ordering according to the degree of field independence, with the Biaka as most field independent, the Bangandu in between and the Gbanu as least field independent, was observed but only for two tests, the African Embedded Figures Test and the Portable Rod and Frame Test. This evidence is not convincing since with the other instruments the expected differences were not found. These tests, the Body Adjustment Test, the Sophistication of Body Proportioning Scale and the Block Design Training Task were only presented to the Biaka and Bangandu subjects. There was no evidence that the Biaka were more field independent as measured with these tests. On the contrary the latter three tests gave results which seemed to point to a higher

degree of field independence of the Bangandu.

Apart from general expectations about the effects of differential adaptation to the ecology, we also paid attention to the variables sex, age and formal education. For the Bangandu we predicted clear sex differences. The men scoring higher on the tests of field independence. It was anticipated that the women would be more dependent on their social relationships and that their contribution to the subsistence economy would be given a low value. For the Biaka we predicted no sex differences. We anticipated that great value would be attached to the women's contributions to the camp. Some support was found in the case of the Bangandu, although the results are not consistent enough to be fully convincing. Observations of the daily behaviour of the Biaka during which we never witnessed manifestations of a subordinate position of the women were in line with what we expected. The fact that no significant differences were found between men and women in this group on three of the four variables reflecting cognitive style came as no surprise. On the A.E.F.T., however, the men scored significantly higher.

For the children no differences between boys and girls were found, either for the Biaka nor for the Bangandu.

Assuming that there would be no need for the further development towards field independence beyond the age at which the children were tested, we anticipated no differences between Bangandu adults and children. This is indeed what was found. It would be interesting to expand the age range in further research to acquire more information in agricultural societies.

For the Biaka it was thought that the children would continue to become more field independent after prepuberty, as a result of a greater need for this cognitive style to succeed in their way of living. This expectation was not confirmed. It is not unlikely that the children of the Biaka are socialized in such a way that the stimulation needed for the full deployment of an independent cognitive style has already been met by the age of twelve. The unsystematic but in our opinion rather convincing observations of the daily behaviour of the young children described in chapter 2, provide some support for this contention. Again, data on younger children than those included in the present study would be elucidatory. At least with two of the tests, the P.R.F.T. and the A.E.F.T. this appears to be possible.

The effect of schooling on the scores on the A.E.F.T. and P.R.F.T. appeared to be minimal. This is in contradiction to what was reported in many previous studies on cognitive test performances. Our finding may mean that, at least for the A.E.F.T., we succeeded in eliminating unwanted variables related to the structure and form of the experimental situation as mentioned in the literature. It is not likely that a lack of reliability has played an

important role. Although the homogeneity of the A.E.F.T. was low for both the Gbanu men and boys, it was quite satisfactory for the Bangandu men and boys.

As far as the P.R.F.T. is concerned, the small deviations from the vertical are a striking feature. Especially the children did extremely well. Looking at the sample means on this test it can be seen that the lowest deviation from the vertical was obtained by the Bangandu girls who were unschooled, while the schooled Gbanu men scored highest. However, the evidence seems insufficient to conclude that the deviations become larger as an effect of schooling.

In a seperate section (chapter 7) the phenomenon of acculturation is discussed and it is indicated how we assessed the degree of acculturation of the individual subjects. After the results of the comparisons in chapter 8, an attempt is made to describe the findings on psychological differentiation in the light of data on acculturation. The P.R.F.T. seems to be the only task not to be influenced by the two variables which summarize various aspects of acculturation, namely Test Related and Contact. Also, when looking at the subscales constituting these two variables, no significant correlations can be observed. This is in striking contrast to the three other tests. The scores on the B.A.T. and especially on the S.B.P.S. and the B.D.T.T. clearly appear to be influenced by aspects of acculturation.

The high correlations between acculturation and field independence did not come as a surprise. From previous studies by Berry (1976) it was known that acculturaton had an impact on the results of tests used in the context of the Psychological Differentiation theory. A problem was that several of the variables investigated so far, like wage employment and schooling, could not be employed. In the acculturation variables we tried to represent the accumulating effect of contact with other cultural groups, especially western culture, with elements like pictorial representation and emphasis on speed of performance.

One clear conclusion emerges from the scores on the acculturation variables in the many subgroups of this study and the patterns of correlations between acculturation and field independence. The least affected test was the one equally foreign to every sample from small Biaka boys to educated Gbanu men, namely the P.R.F.T. Understanding the task was easy, which was somewhat surprising.

The performance on the A.E.F.T. is more influenced by acculturation, but our attempt to construct an instrument which looks familiar and does not frighten the subjects and which is not too tedious, seem to have been succesful. The scores on the B.A.T. are moderately influenced by the level of acculturation of subjects. The S.B.P.S. which requires a drawing to be made and the copying of geometrical forms in the B.D.T.T. clearly put the least acculturated at a disadvantage.

Through multiple regression analysis, we tried to distinguish the effects of the two acculturation variables, which may have masked the effects of the cultural variable in which we were interested. It could be argued that the implications of the adaptation to the ecology on the cognitive style was influenced by another variable. The results indicate that acculturation variables may have a much larger impact than the effects we were looking for. Nevertheless, caution requires us to argue that the hypotheses of this study are not confirmed.

In the chapter on socialization (6) we tried to determine the relationship between socialisation and cognitive style. Indications of a substantial relationship between the style of socialisation and the results on the cognitive style were not found. The various hypotheses, tested with the aid of a systematic standardized observation, were not confirmed. It cannot be said that the parents who were field independent themselves stimulated the children towards own initiative and independence. Neither a relation between the degree of field independence of the children and the socialisation variables, nor differences between the cultural groups on the socialisation variables were found. It can only be concluded that we failed to demonstrate the expected relationship in this particular cultural context. One finding emerged: when the people were asked about their socialisation practices, it was found that the Biaka socialise their children more towards independence while the Bangandu stress compliance to a larger extent.

In a related but separate study (chapter 9) it was demonstrated that a relationship exists between the performance on tests of field independence and a size constancy task. More important than the various results, however, it seems to us that this topic is open to investigation in an empirical way in cross-cultural psychology and secondly that earlier anecdotical evidence was at least partly incorrect.

Chapter 10 describes the results of a study of a possibly important adaptation of the Biaka pygmies to their ecology, the rainforest, their strikingly small physical size. This problem cannot be solved in a single study, but needs a multidisciplinary approach with a long-term perspective. The conclusions may be repeated here that the pygmy children are not the small children of the rainforest who remain small people. They are much like other children, but stop growing around puberty when other children become taller.

11.2 Perspectives

It is not our aim to discuss the implications of the results of our study in the scope of the theory of psychological differentiation in its entirety. We limited ourselves to the investigation of only some of the main elements of the three sectors which can be distinguished in the domain of psychological differentiation (Berry, 1981). The distinction encompasses firstly the segregation of psychological functions; secondly the segregation of neurophysiological functions and thirdly autonomy: the separation of the self from the environment or field, both in the social and perceptual-cognitive domain. The model Berry describes "follows closely a tentative proposal by Witkin and Goodenough (1976)" (p 476). It is the model we discussed shortly in the first chapter. In the model with its sectors one has to distinguish three different levels. The lowest shows the most specific constructs. On this level one element of the sector of segregation of psychological functions was investigated in our study: the human figure drawings. In the sector of the separation of the self from its environment or field, a division is made on the second level, namely in restructuring and interpersonal competencies. It is this part of the model which got most attention in our study. Especially one of the constructs at the very base: embedded figures and block designs, was approached. It has been said already that we present only a part of a larger whole, the Central African Differentiation Project. It is clear that when the whole set of studies e.g. Annis (1980) is considered together, the consequences for the differentiation theory may be clearer. On the basis of the evidence of our own study, however, there is only one conclusion which has to be drawn namely that on the whole the theory did not find support.

What can be the reason that we were not able to demonstrate that the hunting and gathering semi-nomadic Biaka pygmies are more field-independent as a group than the sedentary Bangandu farmers? And how is it possible that when a third group was added, a group with an even more outspoken "sedentary style" (Berry, 1981), only slightly more evidence for the ecological determinants of psychological differentiation was found?

We will have to consider several possible reasons. The most obvious thing to do is to ask oneself if shortcomings in operationalisation of the constructs, bias in sampling, sizes of the samples and a general low level of reliability do not play a role. Together these problems could have obscured the reality and led to failures in confirming the expectations. Of course there are shortcomings, some due to the constraints of the realities of the fieldwork and some to errors. It cannot reasonably be stated, however, that this offers a sufficient explanation for the fact that our whole set of findings does not correspond with the

theory. Besides the large series of studies by Berry, described in his "Human ecology and cognitive style: comparative studies in cultural and psychological adaptation" (1976), there is as yet no study which encompasses as many aspects as the present one. Yet it would be premature to pass a definite judgement on the value of the ecocultural model.

One has criticised the possibility of the differentiation theory to account for the manifestations of field independence over the whole range of differential adaptations to the ecology. Ohonji (1980) for example was not convinced that the theory would meet an important demand for cross-cultural psychology: it being able to give a universal psychology. If it is only possible to illustrate the relation between the development of psychological differentiation and the ecological dimension for people living on the subsistence level, the progress and even the explanatory value of the theory is indeed endangered. Witkin and Goodenough (1981) demonstrated with a large number of studies how "the results of these studies are consistent with the starting hypothesis relating field dependence-independence and restructuring ability to extent of stress on social conformity in the society" (p 91). With a few exceptions like the study by Berry (1966) and Witkin et al. (1974) most studies, however, involved what is called by Berry (1981) "subsistence-level societies representative of those ecological adaptations in the middle range" (p 485). He, as Barnouw (1979) also did, pointed to the lack of data from African and Australian hunters and gatherers and mentioned the, at that moment ongoing, Central African Differentiation Project. Berry discusses in this study the likelihood of a curvilinear cultural scale as the best description of the ecocultural model. The clear advantage of this approach is that not only the change from hunting to farming accompanied by a trend towards the development of field dependence was elucidated, but also the change from subsistence agricultural activity to intensive agricultural and urban industrial activity with its relation to a development towards field independence. Berry (1981) already warned that studies like ours "may shed more light on this end of the scale, but clearly a much greater research emphasis is required here before any definitive statements can be made" (p 485). Yet it should be noted that at any time when efforts to find verifications of what a theory implies fail, without results, the likelihood that the theory itself stays a potentially valuable one for the progress of psychology is diminished.

In some respect the results of this study support an interesting conclusion reached by Okongi (1980) when he observed that "there do not appear to be universal sex differences in cognitive style" (p 36). (Our study, although not aimed at finding these differences for both the cultural groups involved in the main comparisons, did

not result in any consistent pattern of males being more field independent than females.) Okonji (ibid.) was probably right when he noted that: "under some circumstances ecocultural influences may completely overlay biological ones" (p 37).

It may be necessary to extend this paradigm. We have demonstrated a substantial impact of acculturation effects on cognitive functioning. The ecocultural influences are generally considered as long term effects accumulating over several generations. For future research we might try to locate groups that show a similar degree of acculturation. But this raises at least three new problems. First, a good definition of acculturation is required, which proved to be difficult in our study. Secondly, it is questionable whether someone from a third culture, the researcher, can decide whether two groups are equally acculturated, i.e. occupying the same position on a continuum. A third problem, arising if the first two are solved satisfactorily, is how to operationalize the variables on which the two cultures will have to occupy equal positions. The measurement would have to be refined to such an extent that control is possible for their influence on test results. Anyhow the acculturative influences on the cognitive development can be studied as the situational input on the behaviour of the individual. This could suggest that the specific input from other cultures, in the form of a transistor radio or a few weeks of schooling have more impact on the individual's behaviour than ecocultural effects which have subtly shaped the groups behaviour for generations.

It could well be that one has to infere that Okonji's conclusion has to be supplemented to the effects of acculturation. The influences might be working in a lifetime on one's functioning in the cognitive domain, shaping the behaviour of the individual and the group to which he belongs. Under some circumstances acculturative influences may completely overlay ecocultural ones.

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SAMENVATTING: Een onderzoek naar ontwikkelingsverschijnselen bij de Biaka pygmeeën en de Bangandu.

Het initiatief tot het onderzoeksproject, waarvan deze studie een onderdeel vormt, werd genomen door wijlen Dr. H.A. Witkin in het begin van de jaren zeventig. De theorie van de psychologische differentiatie was het uitgangspunt voor een vergelijkende studie bij twee groepen die in dezelfde fysische omgeving wonen, waar ze zich op verschillende wijze aanpasten aan de ecologie. In meerdere eerder gedane onderzoeken, was aangetoond dat de cognitieve stijl van de veldonafhankelijkheid, welke een manifestatie is van de psychologische differentiatie, in verband staat met de ecologische adaptatie. Het werk van Berry bijvoorbeeld, toonde aan dat de Eskimo jagers relatief meer veldonafhankelijk waren dan de Afrikaanse Temne landbouwers, wanneer zij werden getest met taken die het opsporen van elementen vragen welke verborgen zijn in een groter betekenisvol perceptueel geheel. Een belangrijk probleem was echter gebleven dat in de tot zover gedane onderzoeken een aantal sociaal culturele en ecologische variabelen constant gehouden konden worden, maar andere niet. Alternatieve verklaringen konden derhalve niet afgewezen worden. Om nu een beter begrip te krijgen van de determinanten van de perceptuele verschillen welke waren gevonden, zochten wij naar groepen die in hetzelfde gebied woonden, maar er zich op verschillende wijze aan aanpasten. Uit de schaarse informatie over de groepen die in, en aan de rand van, het regenwoud van het zuidelijk deel van de Centraal Afrikaanse Republiek wonen, concludeerden wij dat de Biaka pygmeeën en de Bangandu een goede keuze waren. Van de Biaka konden we aannemen dat ze jagers - verzamelaars waren en de Bangandu leken geheel sedentaire landbouwers te zijn. Het was bekend dat de beide groepen een specifieke relatie hebben van wederzijdse economische afhankelijkheid. Verder werd aangenomen dat de Biaka een sterk egalitaire maatschappij vormden, terwijl de Bangandu de voor dit deel van Afrika kenmerkende sterk hierarchische sociale ordening tonen. Tijdens het pilot werk in het veld bleek dat de Bangandu verschilden van de Temne uit het onderzoek van Berry. Deze waren aangewezen op een hoge mate van voedselaccumulatie met slechts een oogst per jaar. Daar deze hoge mate van voedselaccumulatie sterke invloed schijnt te hebben op de ontwikkeling van veldafhankelijkheid, de hierarchische ordening van de maatschappij en een socialisatie gericht op gehoorzaamheid, werd een derde groep toegevoegd aan het onderzoek, de Gbanu van de meer noordelijke savanne.

In het eerste hoofdstuk wordt beschreven hoe de theorie van de psychologische differentiatie een verklaring biedt voor verschillen in cognitieve stijl tussen groepen die op verschillende wijze aan hun omgeving zijn aangepast. Eerdere studies worden besproken en uitgelegd wordt welke verschillen we verwachtten te vinden tussen de groepen in

ons onderzoek. In het tweede hoofdstuk wordt een globale beschrijving gegeven van de Biaka en de Bangandu als groep. In hoofdstuk drie wordt beschreven hoe de verschillende subgroepen die in ons onderzoek optreden werden samengesteld naar cultuur, leeftijd, geslacht en scholing. Betrekkelijk veel aandacht werd besteed aan het construeren van tests en testprocedures om een zo betrouwbaar en valide mogelijke vergelijking te maken. Speciale methoden werden ontwikkeld om de ongewenste invloed van variabelen als verschillen in vertrouwdheid met de testitems zo klein mogelijk te houden. In hoofdstuk vier wordt de testconstructie beschreven, terwijl hoofdstuk vijf de praktijk van het veldwerk belicht.

Ondanks onze pogingen de groepsvergelijkingen zo valide te maken als mogelijk was, werden de verwachte verschillen in het algemeen niet gevonden. Voor een ordening in mate van veldonafhankelijkheid met de Biaka als meest, de Bangandu een middenpositie innemend en de Gbanu als minst veldonafhankelijk, werd nauwelijks steun gevonden en waar dit gebeurde alleen bij de African Embedded Figures en de Portable Rod and Frame Test. De drie andere tests, de Body Adjustment Test, de Sophistication of Body Proportioning Scale en de Block Design Training Task werden alleen afgenomen bij de Biaka en Bangandu. De resultaten leken te wijzen op een grotere mate van veldonafhankelijkheid bij de Bangandu wat tegengesteld is aan de verwachtingen. De bevindingen worden beschreven in hoofdstuk acht.

Ten aanzien van de variabelen leeftijd, geslacht en schooling was sprake van een complex geheel van verwachtingen, beschreven in hoofdstuk een. Deze verwachtingen werden over het algemeen niet bevestigd blijkens de resultaten in hoofdstuk acht.

Een apart hoofdstuk (zeven) werd gewijd aan het verschijnsel acculturatie. De geschiedenis van de invloeden op de Biaka en Bangandu culturen worden beschreven in een historisch overzicht. Voor elk individu wordt beschreven hoe de mate van acculturatie werd gemeten met behulp van twee variabelen Acculturation Test Related en Acculturation Contact; (de laatste alleen voor de Biaka en Bangandu). Beide zijn samengesteld uit meerdere subschalen. De hoge correlatie tussen acculturatie en veldafhankelijkheid was geen verrassing. Uit eerdere studies van Berry was gebleken dat acculturatie invloed heeft op de test die in het differentiatie-onderzoek worden gebruikt. Een probleem was echter dat de gebruikelijke benaderingen met variabelen als loondienst en scholing niet konden worden gebruikt voor de Biaka pygmeeen. Met onze variabelen probeerden we het cummulatieve effect van contact met andere culturen en wel speciaal die met de westerse, met zijn elementen als picturale representatie en nadruk op snelheid en prestatie, te onderzoeken.

Met behulp van multiple regressie analyse trachtten we

de effecten van de twee acculturatievariabelen te schatten. Zij immers kunnen de effecten van de eco-culturele variabelen hebben gemaskeerd. De resultaten wijzen erop dat de invloed van de acculturatie variabelen veel groter zijn dan die van de eco-culturele variabelen waar wij in eerste instantie naar zochten. Toch moet vastgesteld worden, dat de hypothesen van deze studie niet bevestigd werden, alhoewel de oorzaken hiervan misschien duidelijker geworden zijn.

In hoofdstuk zes over socialisatie trachtten wij de relatie tussen socialisatie en cognitieve stijl te bepalen. Er werden geen aanwijzingen gevonden voor een relatie van enig belang tussen de stijl van de socialisatie en veldonafhankelijkheid. Er mag niet gesteld worden dat ouders die veldonafhankelijk waren de kinderen meer stimuleerden tot eigen initiatief en onafhankelijkheid. De verschillende hypothesen, onderzocht met een standaardobservatie de Tower Building Task, bood daarvoor geen steun. Een relatie tussen de mate van veldonafhankelijkheid van de kinderen en de socialisatievariabelen zowel als verschillen op de socialisatievariabelen tussen beide groepen, werden niet gevonden. Alleen wanneer volwassenen werden gevraagd naar concrete dingen in de praktijk van de socialisatie bleken de Biaka de kinderen meer te stimuleren tot onafhankelijkheid dan de Bangandu.

In een verwante maar aparte studie (hoofdstuk negen) werd een relatie aangetoond tussen de prestaties op tests voor veldonafhankelijkheid en een grootte-constantie taak. Belangrijker dan de verschillende resultaten lijkt echter dat deze relatie empirisch te onderzoeken blijkt met de cross-culturele methode en dat eerdere anecdotische evidentie verworpen moet worden.

Hoofdstuk tien beschrijft de resultaten van een studie naar een mogelijk belangrijke aanpassing van de Biaka pygmeeën aan het leven in het regenwoud: hun opvallende geringe lichaamslengte. De conclusie is dat de pygmeeën kinderen niet de kleine kinderen van het regenwoud zijn die kleine volwassenen worden. Zij gelijken sterk op alle andere kinderen, alleen schijnen ze op te houden te groeien in de periode waarin andere kinderen betrekkelijk snel hun volwassen lengte bereiken.

STELLINGEN

1. Het is waarschijnlijk dat de belangstelling voor de theorie van de psychologische differentiatie in de cross-culturele psychologie mede te danken is aan het feit, dat in tegenstelling tot wat bij bijvoorbeeld het concept intelligentie wel het geval is, het element van waardering geen uniforme en herkenbare rol lijkt te spelen.

2. De conclusie van Barnouw: "The culturel evolutionary sequence posited by Berry, proceeding from more to less psychological differentiation, is at odds with the ontogenetic development described by Witkin, moving from less to more differentiation" is onjuist.
Barnouw, V. Culture and personality. Homewood Ill.: The Dorsey Press, 1979, p 180.

3. Dat het schema van Bochner voor "Outcomes of culturel contact at group level" niet voldoet, wordt duidelijk wanneer hij als voorbeeld van "Contact outcomes" tussen groepen in dezelfde samenleving noemt: "Genocide of newcomers by insiders" in Nazi Duitsland.
Bochner,S. (Ed.) Cultures in contact. Oxford: Pergamon, 1982, p 25.

4. De veronderstelling van Reuning en Wortley dat Bosjesmannen veldafhankelijk zouden zijn, berust op een in de literatuur traceerbare reeks van misverstanden.
Reuning, H. & Wortley, W. Psychological studies of the Bushmen. Psychologica Africana,Monograph Supplement, 1973, no 9, 1973.

5. De post hoc suggestie van een curvilineair verband tussen twee variabelen wordt te vaak gebruikt om strijdige resultaten van verschillende onderzoeken toch met elkaar te verzoenen.
Leidermann, P.H. & Leidermann, G.F. Familial influences on infant development in an East African agricultural community.
In E.J. Anthony & C. Koupernik (Eds.) The child in his family. Vol. 3: Children at psychiatric risk. New York: Wiley, 1974, p 305.

6. Het is kenmerkend voor een snoeier met enige ervaring en deskundigheid dat hij weliswaar het vruchthout kort houdt, maar de waterloten niet spaart.

Samenvatting beleidsvoornemens van de minister van onderwijs en wetenschappen mede namens de minister van landbouw en visserij betreffende de taakverdeling en concentratie in het wetenschappelijk onderwijs.
's Gravenhage, juli 1981.

Cause, D.H. De koninglycke hovenier. Aanwijzende de middelen om boomen, bloemen en kruyden te zaayen, planten, aenqueeken en voortteelen. Amsterdam: Marcus Doornick op de vygendam, 1676.

7. Bij de behandeling van een slangebeet dient naast de op een vergiftiging gerichte actie, waarvoor helaas nog steeds geen uniforme en duidelijke richtlijnen zijn, het toedienen van antibioticum routine te zijn.

8. De sportjacht in Nederland heeft geen zinvolle ecologische functie en is schadelijk voor het milieu.

Vgl. DeVore,I (Ed.) Man the hunter. Chicago: Aldine, 1968.

9. Het is waarschijnlijk onvermijdbaar dat wanneer in een rechtsstaat de controle op het gedrag van de individuele burger in steeds grotere mate ontoelaatbaar wordt geacht, deze rechtsstaat juist door hen die zich daardoor bedreigd voelen, wordt ondergraven.

10. Uit het verschil in beloning tussen de boomchirurg en de arts die de heelkunde beoefent, kan men afleiden dat niet alleen de ecologische waarde van bomen sterk wordt onderschat, maar ook het reeds door een van de Marx' Brothers geconstateerde extra risico dat de eerstgenoemde loopt uit een patient te vallen.

Stellingen behorende bij: Jan M.H. van de Koppel,
A developmental study of the Biaka pygmies
and the Bangandu.

SWETS & ZEITLINGER B.V.